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THE
GEOGRAPHICAL MAGAZINE.

JANUARY, 1875.

THE GREAT AFRICAN DISCOVERY.

SURVEY OF LAKE TANGANYIKA BY LIEUTENANT CAMERON, R.N.

THE most interesting problems which remained to be solved in African geography were the system to which lake Tanganyika belongs, and the course of the Congo River. One of these great questions has been settled by Lieutenant Cameron, and he has thus made a geographical discovery of the first importance.

This Tanganyika problem has exercised the ingenuity of geographers for the last sixteen years, and has given rise to various conflicting theories. The lake was discovered by Burton and Speke on the 13th of February 1858. Speke crossed from Ujiji to the island of Kasesenge, near its western shore, in March: between the 14th of April and the 14th of May Burton and Speke explored the northern portion of the lake in two open canoes, but in the end of May, owing to the failure of supplies, they were obliged to commence their return journey. Although the stay of these explorers was comparatively short, Captain Burton succeeded in collecting an astonishing amount of information from the Arabs. He describes the lake as occupying a position on the western extremity of the eastern third of the breadth of Africa, and as lying parallel to the Inner African line of volcanic action. The general formation suggested to him the idea of a volcano of depression, not of a reservoir formed by the drainage of mountains. Judging from the eye, the walls of this Tanganyika basin rise in an almost continuous curtain to 2000 or 3000 feet, and its length is over 300 miles, with a mean breadth of 20 miles. Burton found the water of the Tanganyika to be deliciously sweet; yet a careful investigation and comparison of statements, led him to the belief that the lake receives and absorbs the whole river system of that portion of the Central African depression whose watershed converges towards the great reservoir. Burton ascertained that the Rusizi flowed into the lake at the northern, and the Marungu at the southern extremity, while on the eastern side he had himself descended the incline for 240 miles, until he came to the shores of the lake, and had seen that the Malagarazi and other rivers flowed into it. He, therefore, conjectured that Tanganyika had no outlet, suggesting that it maintains its level by an exact balance of supply and evaporation, and that the freshness of its waters is accounted for by the saline particles, deposited in them, being wanting in some constituent which renders the salt evident to the taste.

But the uncertainty gave rise to endless discussion, and the solution of the question was certainly one of the most important achievements which remained for future African explorers. Some geographers maintained that the Rusizi flowed out of the north end of the lake, and that consequently Tanganyika was the main source of the Nile, and this theory received some confirmation from the reports recently collected by Sir Samuel Baker.* Others suggested that the outlet was from the eastern side, and that the Ruaha or Lufiji carried the waters of lake Tanganyika to the Indian Ocean;† while a third school, led by Dr. Beke, contended that the lake had no outlet.

Dr. Livingstone added to the knowledge on the subject which we derive from Captain Burton's admirable work. But the health of the great explorer was completely worn out when he reached the southern extremity of Tanganyika in April 1867, and little reliance can be placed on his observations, as he says that his head was out of order at the time. He was then suffering from a severe attack of fever, and in November 1871 he had lost all count of time. In March 1869 he passed along the west coast of the lake, at a time when he was again suffering from illness; and during the fourteen hours of March the 7th, making the voyage against a head wind, and most of the time in the darkness, he appears to have passed the part of the coast where the outlet actually is. In November 1871 he made a voyage to the northern end of the lake, and found that the mouth of the Rusizi is formed of three branches about 12 to 15 yards broad, and 6 feet deep, with a strong current of 2 miles an hour. He ascertained that all the rivers round the northern end flowed into the lake, and thus confirmed Burton's original conclusions.

Dr. Livingstone himself does not appear to have formed any definite opinion on the subject of Tanganyika hydrography. At Ujiji he observed that a current flowed northwards at the rate of nearly a mile an hour from February to November. Then evaporation is at its strongest, and the water begins to go gently south, until arrested by the flood from the great rains in February; so that there is a flow and reflow caused by rains and evaporation on the surface of a lake 300 miles in length. At one time he seems to have thought there was no outlet, for he accounts for the sweetness of the water by the existence of this current flowing "through the middle of the lake length-

* See our number for December 1874, p. 381.

† See *Ocean Highways* for July 1872, p. 103.

ways."* At another time he says that he has not the smallest doubt that the Tanganyika discharges somewhere, though he may not be able to find the outlet.† A little further on he says that the outlet of the lake is probably by the Longumba River into the Lualaba.‡ But there is some confusion about this name; for in another place the Logumba is said to flow into the lake with a rapid current.§

The question was left in a complete state of uncertainty, and the larger portion of the lake was unsurveyed and unvisited, when Lieutenant Cameron reached its shores on the 21st of February 1874, exactly sixteen years after their discovery by Captain Burton, so that the young explorer had most important geographical work before him on the lake, previous to continuing his adventurous journey to the far interior.

Before this work was commenced, Cameron was careful to complete the duty on which he was primarily employed. He had secured the safety of Livingstone's maps and last journals by supplying his servants with provisions to take them from Unyanyembe to the coast. But one of the most important of Livingstone's rough maps, with two note-books, was left at Ujiji, and Cameron's first care was to secure these precious relics, and to forward them by a sure hand to Zanzibar. They have now arrived safely in England. By these services Cameron has earned the lasting gratitude of all who value the labours of his great predecessor Livingstone.

The young lieutenant then devoted two months to the survey of the lake, and the investigation of the great African problem which previous explorers had failed to solve. He first established a point of departure by accurately fixing the position of Ujiji by a good set of lunar observations, and meridian altitudes. The longitude is 30° 4' 30" E., and the latitude 4° 58' 3" S. The height of the lake above the sea was fixed by seven boiling-point thermometers, four aneroids, and two of Captain George's mercurial barometers. The result by the boiling-point gives an elevation of 2710, and that by the barometers 2711·2 feet. The aneroids gave the same result. This is the first time that a mercurial barometer has been used in the interior of Africa to ascertain heights; and the result is very satisfactory.

Having accurately ascertained these data, the explorer proceeded to survey the southern and unknown portion of the lake, in a large boat with fourteen oars and a sail, which he had succeeded in procuring. He left Ujiji in March; and coasted to the southern end, examining river after river, and finding that they all flowed into the lake. He then proceeded to explore the western side, and, at a distance of 25 miles to the south of the Kasenge Islands, visited by Speke and Livingstone, he discovered the river which forms the outlet to lake Tanganyika on the 3rd of May 1874. This river is called the LUKUGA and the current was flowing out at a rate of 1·2 knots an hour. The slight current is exactly what might be expected, and what has been observed in the case of other streams when first leaving their parent lakes, as has been ably pointed out by our correspondent F.R.G.S. (see page 24). After proceeding 4 or 5 miles down the outlet, Cameron's boat

was stopped by floating grass and enormous rushes. He found the chief near the river to be very friendly and intelligent; and he was informed that the Lukuga flowed into the Lualaba; but, being unable to proceed further in his boat, he returned to Ujiji; which place he reached on the 8th of May, in order to hasten his preparations for a further advance. The map showing the results of his survey is on a scale of 5 miles to the inch, and represents the shape of the lake as quite different from what has previously been laid down.

Lieutenant Cameron has taken great pains to obtain all the information possessed by the Arab traders, and, although no very great reliance can be placed on what they say, there can be no doubt that they have much knowledge, and that it is the duty of an explorer to obtain as much of it as possible. The Arabs told him that the name of the Lualaba, beyond Nyangwè—the furthest point reached by Livingstone—was Ugarowwa. One of them had been down it 55 marches, and had reached a place where there were ships and white merchants who traded largely in *chickichi* (palm-oil) and ivory. The name Congo was also mentioned. Cameron considered that these statements pointed unmistakably to the Ugarowwa and the Zaire or Congo being the same river, and he resolved, if possible, to ascertain the fact. There is indeed nothing improbable in the assertions of the Arabs. In the first place we know that Arabs, coming from Zanzibar, have been on the west coast of Africa. On April 3rd 1852 three Arabs, accompanied by forty carriers, arrived at Benguela, having gone by way of Ujiji, crossed lake Tanganyika, and traversed the territory of Cazembé. They were treated with great kindness by the Portuguese, and, as their venture was a success, it was probably repeated by others. It has been said that the name Congo is Portuguese, and that an Arab would not use it. This is a mistake. Diogo Cam, when he discovered that country in 1484, found its native name to be Congo, and it has continued to be so. The great river Congo was also discovered by Diogo Cam. He set up a stone pillar (*Padrão*) on the south side of the entrance, and called the river *Rio do Padrão*. He understood the natives to call it Zaire, but this is merely their general term for any large stream. The river afterwards received the name of Congo because that was the name of the country of which it formed a boundary. The native name of the river Congo below the falls was ascertained by Tuckey to be *Moienzi-enzaddi*. Its name above the falls is unknown. If Arab traders ever reached any Portuguese stations, they would most probably hear and repeat the word Congo. There is nothing absurd, nor even improbable, in the statements made by the Arabs of Ujiji to the English explorer.

Cameron appears to have made his preparations at Ujiji with great promptitude, although his difficulties are very serious, owing chiefly to the thieving propensities of his own people. He has dismissed and sent back to the coast all those who are not willing to proceed, and has started with the best set he could bring together, but with very slender supplies. But though the obstacles are great, the gallant young naval officer has much in his favour. His good temper and courteous treatment of all natives, with whom he comes in contact, will tend to smooth his way. He is already a great and general favourite among the Arabs at Ujiji, who have been most kind and hos-

* *Last Journals* ii., p. 5.

† *Ibid.*, p. 158.

‡ *Ibid.*, p. 159.

§ *Ibid.*, p. 21.

pitable to him. He says that "they have noble ideas of their duty towards a guest, although an uninvited one;" and he "repays them by reading Steere's Suahili tales aloud, which they enjoy immensely. As they have no professional story-teller, they are always ready to hear them over and over again." At the same time this practice is excellent for perfecting his knowledge of the language. He has also found many of the people of the negro race to be intelligent, and he has never experienced the slightest incivility, probably because he is always careful to be punctiliously civil himself, and not to give any cause of offence.

Lieutenant Cameron's observations on the slave trade are especially interesting, and the attention he is giving to this painful subject, as well as the noble example he is himself setting, make him a very fitting successor to Livingstone in furthering the good cause. He says—"The slaves are wanted as porters, and the losses by death or desertion are enormous, and, therefore, the demand is great. The slave trade is depopulating large tracts, and the wretched fugitives are driven to sell each other as a means of subsistence. At present two goats are the price of a boy or girl of from fifteen to twenty, near Ras Kungwe, and in Marungu a goat was 4 *dotis*, and a good slave 5. Our efforts to stop the exportation of slaves are important, but they only check a portion, and that a small one, of the evil. The Wanyamwezi prey on the tribes who have no muskets, and every wretch who can steal or buy a slave must do so. The escaped slaves are another scourge, for they band themselves together, and live entirely by plunder. The number of resident Arabs in the interior is much larger than it used to be, and they all have slaves. The worst feature is that the greater number of these slaves have no employment, except when on a journey, and are not fed by their masters, so that they have to live by robbery. The *Ruga-ruga*, or *Sanditi*, round Taborah, are mostly slaves or runaways. In going round the lake I was constantly shown places where villages had been, and the inhabitants of which had been carried off for slaves. There is a great internal slave trade, and demand for slaves, which our cruisers can never touch, and, indeed, the stopping of the sea traffic is but too likely to increase the evil, for many now engaged in that traffic will settle in the interior, where the trade will continue to flourish." Cameron looks to the opening up of the great rivers and lines of communication by legitimate commerce as the only means of checking and eventually destroying the internal slave trade. It is from this point of view that he looks upon the identification of the Lualaba with the Congo as a discovery of most beneficial import to the people of Africa. His survey of lake Tanganyika, and his great discovery that its outlet flows towards the Lualaba basin, places him in the first rank of African explorers.

The further discovery of the course of the Congo will be the greatest achievement that remains to be done on that continent; for the difficulties are so serious that they can scarcely be exaggerated, and it will call forth qualities of no ordinary kind to surmount them. Cameron's first idea was to have obtained some light canoes, and, to have followed down the outlet from its commencement. He subsequently appears to have determined to make direct for Nyangwé, across the Manyema country, and to descend the great river from that point.

He of course can be the only judge, and he will no doubt have selected the route which, while promising valuable results, appears to present, on the whole, the fewest obstacles. He started from Ujiji on his lonely and chivalrous expedition, on the 20th of last May, and surely he will take the hearty good wishes of all true Englishmen with him. For not only is the gallant sailor, in spite of difficulties such as few are ever called upon to face, attempting a feat which will redound to the credit of his country, but he is also worthily representing, by his kindly treatment of the natives, that noble profession to which he owes some of his best qualifications as a traveller and as an officer.

The undertaking will also involve great expense, and it is necessary to anticipate the requirements of the bold explorer and his party by raising a fund to meet them. The Council of the Royal Geographical Society, whose agent he is, has headed the Cameron Expedition Fund by a subscription of 500*l.* Many other sympathizers have also come forward, and the amount already subscribed is 994*l.*, or, including the grant of the Council, 1494*l.* Against this has to be placed 61*l.* for advertisements and additional articles of outfit sent to Zanzibar through Mr. Stanley, 105*l.* drawn in March, 66*l.* for payment of servants and of the messenger who brought the letters and Dr. Livingstone's map and journals to the coast; and 312*l.* drawn for expenses after completing the survey of lake Tanganyika. This leaves a balance of 950*l.*, which, it is confidently hoped, will be largely increased as soon as the people of England are fully aware of the necessities of their young countryman in the heart of Africa, and of the glorious work that he is bravely attempting to do, alone and single-handed.

Our map of Tropical South Africa illustrates the discoveries of Lieutenant Cameron, and shows the region which he is now attempting to cross. It is also intended to illustrate the progress of geographical exploration. It exhibits the routes of all European travellers who have visited the interior up to the date of publication, and thus enables our readers to realise to how great an extent our maps are necessarily based upon the reports of natives, and how much there is still left to be cleared up by future explorers. With respect to the hypothetical geography of our map it may be appropriate to offer a few remarks. We have availed ourselves to the fullest extent of the very ample native information collected by Livingstone. There can be no doubt that Livingstone's Western Lualaba is identical with the Lualaba across which the Pombeiros were ferried when travelling from Muata Yanvo's to Casembé's town. On the maps published hitherto, including that "conjectural" one accompanying Dr. Livingstone's *Last Journals*, which professes to embody Livingstone's views *par excellence*, that river is made to flow to the south and west, and having entered the Kasabi or Loke, it is assumed to join the Western Lualaba. We are, however, of opinion that it flows to the north. The account of the Pombeiros contains nothing to the contrary. L. Magyar, who would certainly not have omitted mentioning so important a river had he crossed it, says nothing about it, and its northern direction is, moreover, most in accordance with Livingstone's own statements. From Mpweto's, we are told, it is four days to the Lufira in a westerly

direction; Katanga lies ten days south from where the Lufira enters lake Kamolondo, and ten days north from the sources of that river. From Katanga to the Western Lualaba is seven days W., and to lake Chibungo (Lincoln) twelve days N.N.W. Elsewhere we learn that the distance between the Eastern and Western Lualaba is twelve days. These distances and bearings are quite reconcilable with our map, but not with that prepared for the editor of the *Last Journals*. If our interpretation is the correct one, the Lomame and Loeki must be distinct rivers, thus confirming the statement of one of Livingstone's native informants. The Kasabi, or Loeki, according to Ladislaus Magyar, flows to the north and east, and finally enters a lake (Mouro, or Uhanya), which is probably identical with Livingstone's Urengé or Ulenge, which Mr. Waller has thought fit to omit from his map.

As regards lake Tanganyika we do not believe in its connection with Mwuatan N'zige, and accept unreservedly Cameron's assertion of its discharging a river to the west. The geography of the Nyanza requires further elucidation. Livingstone tells us that the lake is called Okara on its eastern side, and communicates by a narrow arm with the Kavironda (on Mr. Waller's map Livingstone is misinterpreted in the usual manner, for Kavironda is there shown as a separate lake, and the Kidette River, which according to Livingstone is an affluent of lake Naibash, is made to connect it with the Okara). Livingstone thus confirms Colonel Grant as respects the great extent of the lake in question, and the facts adduced by the latter go far to convince us of the continuity of the lake between Muanza, where Speke first saw it, to Uganda in the north. Colonel Gordon's explorations will no doubt set at rest this much discussed question. In conclusion, we may state that Livingstone's journal has enabled us to trace Roscher's route more accurately than has been done hitherto. Roscher crossed the Rovuma at Hingomanye, identical with Livingstone's Ngomano, where there is a much frequented ferry. Roscher's Mamemba is Livingstone's Moembe, and the village Hisonguny, where Roscher was murdered, and his journals were stolen, is within half a day's journey from that place.

THE MINERAL WEALTH OF CENTRAL ASIA AS BEARING ON RUSSIAN PROGRESS.

'In conquering Turkistan,' said a Russian officer to me last year, on the road to Samarcand, "we are playing a game of roulette. We have lost our first few stakes, and lost heavily; our only chance of recouping is to play on."

And, in truth, there is a strong flavour of gambling about the first recorded movements of Russia in this direction. It is probable that Peter the Great, in his persevering efforts to obtain a hold upon the regions beyond the Caspian (as a set-off against his expulsion from the Azoff and Black Seas by the fatal treaty of the Pruth), was actuated quite as much by the golden legends of the Asiatics respecting their fabulous abundance of precious metal, as by any hope of opening a new highway for the commerce of Russia. The instructions given by him to the exploring expedition of Florio Beneveni and Niccolo Minera (1721—1725),

specify as its two main objects:—1. To ascertain the feasibility of diverting the Oxus into the Caspian; 2. To estimate as exactly as possible the mineral wealth of Central Asia. Accordingly, we find Beneveni sending his imperial master "a handful of sand mixed with gold-dust, gathered in the Lower Oxus;" and Minera (who penetrated as far as Balkh) filling his despatches with a crowd of half-truth, half-mythical details; how the mountaineers of Badakhshan "sink large fleeces of wool in the sand of their rivers, and after a while dig them up covered with gold-dust;" how "there are mighty treasures of gold, silver, and musk, in the cities of Kaskar (Kashgar), Dizan, and Margilian;" how the river that flows past Samarcand "is called Zer-Affshan (gold-giving), because of its bringing down much gold from the eastern hills;" with much more to the same purpose. These beliefs long survived their originators, and were greatly strengthened by the amazing influx of precious metals into Orenburg and Troitsk between 1748 and 1755, following upon the plunder of the ancient treasuries by Nadir Shah.

It was reserved for the present generation to dispel these visions, by showing, through clear and minute investigation, what Central Asia possesses and what it does not. Immediately upon the fall of Tashkend, in June 1865, which finally established Russia's supremacy in Turkistan, the local Government began to fit out the expeditions which, in the two following years, surveyed the basin of the Syr-Daria, and the adjacent kingdoms of Bokhara and Kokan. These surveys established the richness of Eastern Turkistan in coal, iron, lead, copper, naphtha, saltpetre, and rock-salt, as well as the presence of gold in various spots; while the statements of Russian as well as native travellers agree in asserting an almost fabulous abundance of these and other minerals in the spurs of the Thian-Shan Mountains (which divide Asiatic Russia from China) and the still unannexed hills of Badakhshan.

Taking the coal first, as the most important item in a region where the fruit-trees have frequently been cut down for fuel, we find, in Eastern Turkistan alone, five fields already opened for working, viz., two in the Kara-Tau Range, which runs parallel with the Syr-Daria from Djulek to the town of Turkistan; one on the Tchirtchik, 40 miles north-east of Tashkend; one in the hills to the south of Khodjent, the easternmost of the Russian cities on the Syr-Daria; and one (the largest) on the Naryn, or Upper Syr-Daria, in the Khanate of Kokan. Of this last I received a full written description and map, during my stay at Tashkend last autumn, from one of its proprietors, M. Mikhail Feodoroff, who accompanied Colonel Schaufuss's expedition into Kokan in 1867. After detailing his discoveries of naphtha, lead, copper, iron, &c., he proceeds as follows:—

"The coal-fields begin from the very bank of the Naryn, and cover a superficies of 96 miles, distant 40 miles from the Kokanese town of Namangan, 80 from Kokan itself, and 200 from Tashkend. . . . Our shafts have laid open four beds, one above another; the first $1\frac{1}{2}$ arsheen (2 ft. 11 inches), the second $1\frac{1}{2}$, the third 2, and the fourth 3 arsheens. All around them lie rich veins of lead, iron, and copper. . . . The coal might easily be floated down to Tchinez on rafts, and carried thence by land to Tashkend (43 miles),

This paper is much exaggerated with respect
to the coal supply of Turkistan -
See Schuyler's "Turkistan" vol. i. 320 sqq.

The right of working has been fully conceded by the Khan of Kokan."

M. Feodoroff told me, in the course of conversation, that the private coal-fields are not thriving at present, and that both he and the other proprietors would willingly dispose of them, but doubted whether any foreign company would be allowed to exist in Turkistan, whence all foreigners are so jealously excluded.

With regard to the other fields, the coal obtained from them is satisfactory both in quantity and quality. The chief obstacles are—1. The extreme difficulty of transport in this roadless region; 2. The aversion of the native population to coal fuel—which last, however, is not unnatural, their stoves and ovens being (as I have had occasion to notice when travelling among them) adapted solely for wood. Still, despite these hindrances, much has already been done. The long talk of introduction of coal into the Aral flotilla of six steamers was carried out in 1868, 40,000 poods being served out at once; and as early as the end of 1869, coal was selling both in Tashkend and Khodjent at 20 kopecks (6½*d.*) per pood—the pood being 36 lbs. English. For the present, however, the hopes of the Turkistan coal-proprietors appear to centre chiefly in the establishment of regular steam navigation upon the Syr-Daria and Oxus, as well as upon the Orenburg-Samarcand Railway; but it is clear that, with these new fields superadded to the 16,000 square miles of splendid anthracite on the Lower Don, the 15,000,000,000 poods of the "Moscow Basin," the coal-beds of Lithuania, Kiev, and the Caucasus, Russia may yet become a great source of supply, as soon as her communications shall be completed.

Naphtha seems to be tolerably abundant along the Upper Syr-Daria. M. Feodoroff's report mentions several fine sources on the Mai-Boolak River, about 12 miles from the Naryn coal-field above described. According to him, the working of these springs dates back to a very early period.

"In the course of one of our borings," says he, "we came upon traces of an old well, and had no sooner cleared away the rubbish which blocked it, than the naphtha spouted into the air like a fountain, rising in such abundance that we took out in that one day 400 buckets. The well was of considerable depth, the sides being strengthened with facings of stone and timber in alternate layers. Among the *débris* we found a broken earthen vessel of large size, which had evidently been used for drawing up the naphtha; and from this and other traces we conjectured that this well must belong to a remote period, and had probably borne a part in the religious rites of the fire-worshippers who in former ages inhabited this part of Central Asia."

Rock-Salt is found in numerous spots, but little worked as yet. One of the richest deposits lies about 3 miles from the village of Samgar, on the frontier of Kokan, eastward from Khodjent, the stratum being of considerable superficiality, and 2 arsheens (4 ft. 8 in.) thick. In 1872 the market price at Tashkend was 4 roubles (12 shillings) per pood of best salt, and 30 kopecks (10*d.*) ordinary quality. Of late, however, the markets have been shaken a good deal by the competition of the new quality found in the hills around Samarcand (quoted at 50 kopecks per pood) which is

distinguished by a pinky colour and a very agreeable taste.

The richest veins of *lead* are those in the Toorlan ridge (Kara-Tau Hills) between the town of Turkistan and the village of Tchulak-Kurgan. This field (worked by the Kirghiz for a considerable period before the Russian conquest) is now the property of M. Pervooshin of Tashkend, one of the richest and most enterprising merchants in Central Asia. The proportion of lead is 51⁷/₁₀ths per cent., with a slight admixture of silver. Since 1869 (the date of the contract between M. Pervooshin and the Artillery Department for the supply of lead to the army of Turkistan) the price of lead has fallen from 8 to 3 roubles per pood. The Khodjakent lead-mines, near Tashkend, yield 23 per cent.

Salt-petre abounds in Eastern Turkistan, especially in the hills beyond Karshi (Moore's "Neksheb") a large town 91 miles S.E. of Bokhara. Here the late Emir had a large powder factory, the powder of which was sold in Bokhara for 15 kopecks (5*d.*) for 1¼ lb. Other factories existed in Kokan likewise. The best salt-petre, however, is procured from Guzar, in Northern Afghanistan, which is said to rival Demavend itself in this respect.

Iron is found either mingled with or in close proximity to nearly all the principal coal-beds; but the richest "finds" hitherto are in the Kara-Tau range, containing the Ken-Tass 61¼th per cent. of iron, the Kok-Ti River 50-52 per cent., and the Ausgen River 30 per cent. In the province of Semiretchensk likewise (the north-easternmost corner of Russian Turkistan, lying between Lake Balkhash and the Thian-Shan Mountains) there have been discovered two iron-fields in the neighbourhood of Kopal, about a mile apart, yielding from 12 to 20 per cent.

Kerosene and *asphalt* have been discovered in large quantities in the neighbourhood of M. Feodoroff's coal-fields on the Naryn, near Namangan. The market price of kerosene at Tashkend in 1871-2 was 20 kopecks (6½*d.*) per lb. Asphalt is now beginning to be much used for plastering roofs, to make them proof against rain; the cost of this being 3 roubles (9*s.*) the square *sajen* (7 ft.).

Copper is found in considerable abundance along the beds of the smaller rivers; and veins of it have been discovered about 40 miles from Sergiopol, containing from 1 to 2½ lbs. of copper per pood. Large quantities of copper were obtained by the Khivans, in the beginning of the present century, from the Sheikh-Djelli range (where gold also, according to tradition, formerly abounded) skirting the Oxus from Urgendj down to Bend; but these works have been long since abandoned. Similar veins are believed to exist in the Balkan Hills, which run parallel with the S.E. seaboard of the Caspian; but no accurate survey has yet been made.

As for *gold*, the exaggerated reports of which first drew the Russians to Central Asia, it is the rarest of all metals in Eastern Turkistan, though still sufficiently abundant to feed the hope of important discoveries hereafter, when the great boundary-range shall have become better known. The precipitous gorge of the Tchirtchik, however (which falls into the Syr-Daria near Tashkend), has disappointed the expectations formed of it; and in no part of the country does any organised system of mining exist. The earliest stages

of Californian and Australian digger-life are here to be seen enacting themselves over again. When a Kirghiz or a Doungan wants a dinner, and sees no prospect of earning one, he simply betakes himself to the nearest likely spot, and there, by "pan washing" or breaking the quartz with a hammer, picks up enough to keep him for a day or two. Russian agents, whose professional journeyings have taken them a good deal across the Chinese border, tell me that, on the other side of the Thian-Shan, gold sells considerably under the market-price, and that it is no uncommon thing for a Chinese trader to contract for the entire amount of gold obtained by a gang of labourers in a whole summer's work, on condition of clothing and feeding them for a twelvemonth. In the present day, the golden legends which formerly grouped themselves around Kashgar, Yarkand, and the valley of the Zer-Afshan, seem to be concentrated upon the little mountain triangle of Badakhshan. I do not, indeed, place much reliance in the stories told of it by the Afghan and Bokhariote traders whom I met at Samarcand; but enough has been ascertained respecting this Eastern El Dorado to make it certain that the falling off of its once famous trade in rubies and lapis-lazuli is not in any way owing to the exhaustion of the supply, but simply to the difficulty of transport and the dangers of the caravan route.

Summing up, then, the results already arrived at, we find six great mineral storehouses in Central Asia—the Kara-Tau Hills, the main range of the Thian-Shan, the Samarcand Valley, the Balkan ridge along the eastern Caspian, the Khivan range of Sheikh-Djelli, and Badakhshan. The three first of these have been in the power of Russia for years, and her settlements on the eastern seaboard of the Caspian have made her virtual mistress of the fourth. The fifth has just been given into her hands by the conquest of Khiva; and all that now remains for her to do is to annex the sixth.

"It must be admitted," says Captain Kostenko, in his admirable report upon Central Asia, "that hitherto our researches into the mineral wealth of Turkistan have been fruitful of hopes rather than results; but, judging by what we have discovered during the last three years, and by the advantageous position of the various mineral strata in the immediate vicinity of beds of coal, we have a right to anticipate a bountiful harvest in the future."

Here, then, is a clear and definite object, infinitely more feasible, as well as more remunerative, than the visions of impossible gold-fields, or the romantic dreams of universal conquest, which floated before the minds of the original invaders. In the face of such calculations, the Governor-General of Tashkend may fairly say with Bertram—

"No visionary fool had I
Sought El Dorados in the sky."

Even in Russia's apparent madness of annexation there is a certain method. Hitherto, indeed, she has been literally "jetant son argent par les fenêtres."

In 1868 (the year of the capture of Samarcand) her annual deficit was 2,500,000 roubles (335,000%); in 1869 it had risen to 4,000,000 roubles; and the two following years (though the total number of troops in Turkistan did not exceed 26,000 of all arms) showed an even more unpromising result. But all this matters

nothing, if it only bring her nearer to the full possession of treasures sufficient to repay her losses a thousand times over. The three great essentials of a new country are coal, iron, and gunpowder; and Turkistan, as we have seen, is richly supplied with all three. The position of the principal mineral strata side by side with beds of coal is an immense advantage; nor are able and energetic directors wanting. What is wanted now is an adequate supply of labouring hands; and these the Russian Government can always command if it will. On my way up the Syr-Daria I saw caravan after caravan of Russian peasants plodding eastward, drafted from the Volga to the wild regions lying between Lake Balkhash and the Chinese border; and the same fiat which sent them thither can at any moment people the mines and factories of Turkistan with the artisans of Central Russia.

As regards the future annexation of the Kashgar-Davan Range and the plateau of Badakhshan, the proved abilities and sleepless hatred of Yakub Beg are too palpable an obstacle in Russia's path, not to be fully taken into account by her. All Russian critics readily admit that the new master of Kashgar may become a formidable enemy; but even for this evil there is a cure. The entanglement, like other Gordian knots of Eastern diplomacy, may be cut if it cannot be unravelled. The ruler who has been raised by one revolution may be overthrown by another—no difficult matter for the proverbial skill of Russian emissaries; and, once fallen, he may easily be replaced by some marionette, worked by the concealed fingers of Russian officialism. Nor is a plausible cause of quarrel wanting. "Yakub Beg," says one of the greatest living Russian authorities upon Central Asia, in a recent *résumé* of this question, "is specially indignant with us on account of our erection of Fort Narinsk on the left bank of the Upper Syr-Daria, which he considers part of his own dominions. He has evidently no conception of the virtue of an international treaty, and refuses to be convinced that, by the treaty of Tchugutchak, the Chinese Government ceded to Russia not merely the left bank of the Syr-Daria, but all the parallel ridges of the Thian-Shan as far as its southern slope."

Here, then, is a *casus belli* ready made; and its probable consequences are stated frankly enough by the same writer:—

"It is sufficiently certain that Yakub Beg wishes to have no connection with us whatever, hating and fearing us equally, ever since he felt our strength at Ak-Metchet and Tashkend, when he served as an officer in the army of the Khan of Kokan. His tyranny and jealousy know no bounds, and the people, groaning under his yoke, look back with regret to the period of the Chinese rule.* [Here follows a short account of the attempts made by MM. Pervooshin and Khloodoff to open a trade with Kashgar, and their failure owing to the restrictions imposed by Yakub Beg.] It would be well both for our local traders and for Russia at large, if there existed in Kashgar a recognised and legitimate government, with which it would be possible to establish friendly relations. It is true that Kashgar itself is an insignificant town, and

* It should be remarked, however, that this account is contradicted both by Mr. Shaw's statements, and by the information given me on the spot by native traders.

Djiti-Shahr [Seven Towns]* a poor country; but it contains several cities of importance, *e.g.*, Yarkand (with 30,000 inhabitants), Khotan, Ak-su, &c., which might form a promising market for Russian goods, and, more desirable still, a connecting link between our traffic and that of the north-west provinces of China. But *so long as Yakub Beg reigns in Kashgar* our merchants will be in no haste to send their goods thither."

This significant deduction recurs farther on in the same work, with increased emphasis:—

"To conquer Djiti-Shahr [Kashgar] would not suit us at present: not that the resistance encountered would be at all formidable, but the occupation of the country would be attended with very heavy expenses. Our best way would be to *establish there a definite Chinese Government*, with which we might not merely treat, but maintain friendly relations. The country is important to us not merely from its intrinsic richness, but also as connecting China with Tashkend and Samarcand. The caravan route from Western China into Kashgar is at first identical with that to Kulджа and Tchugutchak; but at Barkool it branches off along the southern slope of the Thian-Shan, connecting the important towns of Ak-su, Ootch-Toorpan, Yarkand, and Kashgar. The shortest and best route into our territory is through Kokan, whence goods may be carried to Tashkend on one side, and Samarcand on the other."

It is a common error to suppose that all the movements of Russia in the Far East are, so to speak, parts of one definite and well-organised programme, dated back by some enthusiasts as far as Peter the Great. Nothing could well be farther from the truth. By the admission of the Russian generals themselves, their most successful movements were altogether unpremeditated, and frequently attended with consequences the very reverse of what they had anticipated. Forage, water, freedom of communication, the necessity of securing commanding positions—these, and no niceties of strategy, were the moving springs of Russia's advance. In fact, the whole conquest of Turkistan has been a kind of Chinese puzzle, constantly requiring fresh additions to eke out and complete what is already gained. The last and most valuable addition of all—Badakhshan—is still to be made; and then, with her flank secured against attack, Russia will have leisure to pursue her new scheme of a great commercial highway from east to west, which shall draw into itself the entire traffic of Kashgar and Western China, while rigidly excluding any rival currents that may set in from the side of India.† But into this branch of the subject it is best not to enter; for, at this time of day, to raise again the *vexata questio* of Russia's future relations with India, would be a worse crime than recommencing the Tichborne trial.

D. KER.

* The native name of the country, formerly called "Alti-Shaar" (Six Towns).

† According to the Russians themselves, the competition of Anglo-Indian merchandise is already formidable. The value of the goods passing annually through Bokhara alone is 40,000,000 roubles, or between 5,000,000*l.* and 6,000,000*l.*; and of these a large proportion are English.

THE JOURNEY OF THE CHINESE TRAVELLER CHANG-TE-HUI,

FROM PEKING TO THE SUMMER RESIDENCE OF THE PRINCE KUBLAI IN WESTERN MONGOLIA, IN THE YEAR A.D. 1248.

Translated from the Russian version of F. Palladius, by EUGENE SCHUYLER, Esq.

MR. PADERIN, the Russian traveller who last year visited the ruins of Karakorum, alluded, in his account of the journey, to this Chinese narrative. In a note to my abstract of Mr. Paderin's paper, I called attention to it as likely to be worthy of translation. The same accomplished lady* who had supplied the translation of Paderin had already written to say that she had procured the Russian version of this ancient journey, and she had most kindly offered to translate it if desired, when I received the following translation from Mr. Eugene Schuyler, Secretary of Legation at St. Petersburg for the United States of America, and well known for his travels in Turkistan, of which he gave an account last summer at the Royal Geographical Society. I am much indebted to Mr. Schuyler for having taken the trouble to search out this paper (by no means easy to find), and then to translate it and send it to me for publication.

Father Palladius does not, at least in the notes appended, tell us who Chang-te-hui was; but apparently he was one of those doctors of philosophy or religion whom the princes of the family of Chinghiz seem to have had a fancy for summoning to their presence from very long distances. A similar narrative by a Taoist Doctor—Kiu Chang Chun—who was summoned by Chinghiz himself from the heart of China to the Kaan's camp in Badakhshan, was translated into French by the late M. Pauthier, in the *Journal Asiatique*,† and has just been translated again from the Chinese (into English), with valuable notes, by Dr. Bretschneider, of the Russian Legation at Peking.‡

Mr. Schuyler says in his letter:—"I have transliterated the Chinese names so as to give the exact sound of the Russian, pronouncing the vowels as in Italian and the consonants as in English. Palladius follows the Peking pronunciation, which differs much from that of Canton." It is a fact also that the Russian ear takes up sounds differently from the English one, so that from one or other of these differences, or both combined, it is sometimes not easy to recognize tolerably familiar Chinese names in their Russian shape.§ Hence I have sometimes added (in brackets or in notes) the names as presented in English sources. The name of the traveller himself is written by Palladius (according to Mr. Schuyler's transliteration) *Tihjan-de-hoi*; it is given by Dr. Bretschneider (who cites a passage) as *Chang-te-hui*, which I have adopted above as more like what we are used to.

H. YULE.

* Madame Fedchenko, the widow of the lamented traveller, and the companion of his explorations.

† Ser. vi., Tom. ix.

‡ In the *Chinese Recorder and Missionary Journal* (Shanghai), for July—August, 1874.

§ Thus *huan* or *hien*, the denomination of what is commonly called the third class of city, is written *sian*; *ho* for river appears to be written *he*; *Khitan* is written *Kidan*, and so on.

From *Memoirs of the Siberian Section of the Imperial Russian Geographical Society*. Parts ix. and x., p. 582. Irkutsk, 1867.

NOTES OF THE CHINESE TCHJAN-DE-HOI DURING HIS JOURNEY IN MONGOLIA IN THE FIRST HALF OF THE 13TH CENTURY.

[Translated from the Chinese by the Archimandrite Palladius.]

I LEFT Pekin, after ten days' stay there, passed the station Sin-dian in the place Shuan-ta-bu, and came to Nan-kow. Going out of the north mouth of the defile I went in a westerly direction, and passed the station Yui-lin, where there is the inn Lei-tsia-dian, and arrived at Huai-lai-sian. On the east of the city a bridge is constructed of trees laid crosswise, and above and below of stone. On the west of the bridge is a village, but the city is completely ruined.

Going westward from here, I passed on the southern side of the mountains Tsi-min-Shan, where is a post-station called Pin-yui. On the very top of the mountain there is an abode of Buddhist monks. Further on I went along the mountain to the west, and then to the north up the river Sang-an-He. Across the river a bridge is constructed, on which the road goes west to De-sin-fu.

On the north I passed the station Dinf-fan-shui, crossed the "Stone Staircase," and arrived at Suan-de-tchzhov. North-westerly from here I passed through a defile of the sandy range to the station of Suan-pin, and through the defile De-shen-kow arrived at the range of mountains Ehu-lin.¹ On coming down from these mountains is a station—Bo-lo. From here to the north, stations are constructed and managed by the Mongols. Every station is called after the name of the person managing it.² Turning from this range to the north-east, I began to see kikitkas and tents of felt, and nomad villages, in places where there is grass and water, pasture for cattle, and nothing else. Here, Chinese customs are no longer observed.

I soon passed Fu-tchjow, of which only an empty ditch remains.³ On the north from here I came to Tchu-tchjow. There are not more than 100 families that live in it. Here is a Government Office established by the Emperor. There are also magazines belonging to the Department of Salt. On the east of that city is a salt lake, about 100 *li* in circumference, called the "Dog's Lake," on account of the similarity of its shape to that of a dog.⁴ More than 100 *li* north of the city I noticed an old rampart, which stretched far off along the mountains and deep valleys. On the south a ruined town is joined to it. At the question—What is this? the inhabitants answered that under the former dynasty it was a fortified place, in which the boundary guard was quartered.⁵

From this fortress I went four stations more, and then came to Sha-to, in the whole expanse of which there are no stones or clods of earth. From a distance you see, as it were, a chain of low hills and hillocks; but when you come to them they are only sand-heaps. The trees which can grow on this soil are only elms and willows, and these are feeble, scattered about, and grow in clusters. The water is everywhere saline. I went in Sha-to six stations, and then came out of it.⁶ After that I went north-westerly one station to the lake Yui-err-po. There are really two lakes, both in circumference more than 100 *li*. Between

them is a dry passage from north to south. On the south-west of the lake is the temporary palace of the Princess. The external walls of the palace are more than 10 feet high, and about 2 *li* in circumference. In the middle there is constructed a living-room, with two additions on the sides. Behind it, on the north, is the Pavilion of the Tortoise. On the sides are wings. In front there rises a look-out tower. When you go up on it you obtain a very distant view. On the east of the palace are placed the houses of the peasants and artisans, which constitute something like a village. There is a tower with the inscription "In-hoi" (the meeting light, or world).⁷

Four stations from the lake are traces of a long wall which extend to a very great distance. This is also the external rampart of the former dynasty.

Fifteen stations further along runs a river which in depth and width is equal to three-tenths of the river Hu-to (in Northern China). To the northward it is called Kilulian (Kerulun*), that is, "little ass." On both its banks willows grow plentifully. It flows to the east, and has a very rapid current. The residents there say that there are fish in it 3 and 4 feet long, which, however, it is impossible to catch either in spring, summer, or autumn, but in the winter they make holes in the ice and catch them. Along the river there live Mongols and Chinese together. There are some little huts, with earthen roofs. Many cultivate the land, but they only sow hemp and wheat. On the northern side of the river is a large mountain, called Ku-su-vu, that is, "Black Mountain." If you look at it from some distance there seems to be a thick forest on it, but when you are near this turns out to be dark stones, which receive this colour from the constant mists on the mountain.⁸

From the southern side of the mountain I went south-west nine stations, and came to another river, in width and depth equal to one-third of the river Kitulian. Here there are also large fish, which are caught in the same way. This river runs to the west, and is exceedingly swift, so that it is impossible to cross it. In the northern language it is called Kun-du-la, that is "the hare."⁹ I went down the river to the west, one station, to a wooden town constructed by the Kidans [Khitans]. It is about 3 *li* in circumference; the back is turned to the mountain, the front to the river. From this place the river runs to the north.¹⁰

From this village to the north-west, after passing three stations, I arrived at Bilihedu—a place where there are many artisans busy with making bows.¹¹ Then, after one station, I passed by a great lake, about 70 *li* in circumference. The water of it is unusually clear and pure. According to the northern dialect it is called Vuvuge-Nor. From the lake there is a special carriage road to Kholin [or Holin] (Karakorum), which goes first southward and then westward to the distance of more than 100 *li*.¹² From the lake directly west is a small wooden city, also constructed by the Kidans [Khitans]. To the west the city opens on a broad valley, 100 *li* in circumference. Around it are mountains on every side. On their northern side are many pine-trees. Along the water there are poplars and thick willows. In the middle of it runs the river Kholin.¹³ The inhabitants are greatly occupied with

* Which we usually find written as *Kerulun*. The Hu-t'o-Ho runs down from Shansi into Chihli, passing Ching-ting-fu.

agriculture and irrigate their fields. There are also kitchen gardens.

At that time it was the last decade of the first autumn moon (August), and the millet and barley had already dried up. When I asked the reason of this, of the farmers, they told me that three times already there had been a white frost.

From the valley north-west, I went one station to the mountain called *Horse's Head*. The inhabitants said that the mountain received this name because there was an immense horse's head on it. Going by the north side of this mountain, I turned to the south-west and went past the mountain Hulan-tchi-gin,* that is *Red Ear*, so called because it is like a red ear. Here, there are artisans and artists, who work for the Mongols. Here is the river Tami running north-east.¹⁴ After that, I went a station to the "Black Signal." It stands by the side of the post road. Its height is no more than 5 feet. In circumference it is more than 40 paces. Its form is four-cornered. It stands alone in the valley, and is very visible. From afar off you could take it for a large boundary post. Once it received this name.

From the signal I went three stations to the river Tan-gu, over which I crossed. The sources of the river are found in the Tangut country Sisia,† whence it is so called. This river flows also north-east.¹⁵ West of the river there is a high range of mountains. The stones in the mountains are like iron. On the north side of the range there is a thick pine forest. On the southern side of the mountain there is placed the pavilion of the Prince (Khubilai). This is his summer residence.

Having waited here until the end of autumn, we moved on our journey eastward along the post road, passed the Stone Signal, and came to Hulan-tchi-gin.

Hence, we went into the depths of the mountains and hills, and sometimes went and sometimes stopped. We went not more than one station in a day, and never stopped more than two nights. Along the road we did not meet with any remarkable mountains or great rivers, and therefore there is no need to describe anything.

On the 9th day of the ninth moon (October), the Prince, having called his subjects before his chief tent, performed the libation of the milk of a white mare. This was the customary sacrifice at that time.¹⁶ The vessels used were made of birch bark, ornamented with neither silver nor gold; such here is the respect for simplicity.

At last, in the middle decade of the tenth moon (November), we arrived at a mountain, under the protection of which we passed the winter. Here was much frost, the water everywhere strongly frozen, and all hastened to provide themselves with fuel and water before the cold came on. It was impossible to go out without fur clothing. The usual food is meat; rice is considered a precious rarity. On the last day of the year the Mongols suddenly changed their camping-ground to another place, for the mutual congratulation on the first moon. Then there was every day feasting on the tents for the lower ranks. Beginning with

* *Ulan-chili* of Paderin.

† [*Si-hia*, according to our usual way of writing Chinese names, was the Chinese name of the Kingdom of Tangut, conquered by Chinghiz in his last campaign (see Pauthier, *Marco Polo*, p. 153).—Y.]

the Prince, all dress themselves in white fur clothing.¹⁷ Before the chief tent they collect together for congratulation on the third day. On the last day of the first moon (February—March), we again went south-west. In the middle decade of the second moon (March), we arrived at Hulan-tchi-gin, then on the east we came to the mountain "Horse's Head," and stopped there in consequence of the thawing of the rivers. On the ninth day of the fourth moon (May), the Prince again collected his vassals before the chief tent for the libation of the milk of a white mare.¹⁸ The vessels were the same as before. This sacrifice is performed twice a year, on the ninth day of the ninth and the fourth moons. At other periods of the year it does not take place. From this day we began to return again along the post road to the south-west, to the summer residence of the Prince.

In general the Mongols at the approach of summer migrate to high and cool places, and in the winter migrate to warmer places, which are open on the south, and where they can easily obtain fuel and water. During these periods they go from one place to another. To-day they go, to-morrow they stand still, stopping where there is water and grass. Such are the needs and customs of the country.

I was in the Prince's camp ten days altogether. At every interview the Prince was polite to me, and they provided me with tents, pillows, clothing, food, and medicine for every ill. From this it can be seen what kind feeling the Prince had for me, as I know that I am good for nothing, and without talent. I do not know why I was honoured by such attention. Probably the cause of it was the love of the Prince for good, and because, in his attention to the teachings of Confucius, he forgot his lofty position, and perhaps also he wished to entice to himself wise men. I, of course, could not be of use to him in that respect, but served only as an example, after which other men, incomparably worthier than I am, would, without doubt, come to the Prince. For this purpose I have written an account of my journey from beginning to end.

In the year Bu-shen (1248 A.D.), in the summer, on the 15th day of the 6th moon. Tchjan-de-hoi from Tai-yuania carefully wrote.

NOTES OF FATHER PALLADIUS TO THE PRECEDING NARRATIVE.

(¹) Tchjan-de-hoi went to the present town of Suan-hua-fu by a road the same as the present post road, though there is a difference in the names of the towns, which in China frequently change. The present post stations on that road are as follows:—70 *li* from Peking to Tchan-pin-tchow. 60 *li* to the fortress Tsui-yun-guan, placed in a defile, 15 *li* from the southern, and 20 *li* from the northern mouth of it. 60 *li* to the town Huai-lai-sian.* During the time of Tchjan-de-hoi it was destroyed by the Mongols. 60 *li* to the station Tu-mu-i. 60 *li* to the station Tsi-min-i. Here runs the river

* These three places are, according to the orthography of Dr. Bushell's itinerary (more like what we are accustomed to), *Chang-ping-chou*, a walled town a little beyond the famous summer palace of Yuan-ming-yuan; *Chü-yung-kuan* or the Nan-kaio Pass, where stands the splendid marble archway, with its hexaglott inscription, which is engraved at the end of vol. i. of *Marco Polo*; and *Huai-lai-hien*. The Yui-lin of the old Chinese traveller also occurs in Dr. Bushell's itinerary; as does "the rocky peak of *Chi-ming-Shan*."—Y.

Yan-He, which forms a branch of the San-gan-Hc,* and is not the same river, as the traveller states. There is now no stone bridge over this torrent. The Desin-fu of Tchjan-de-hoi, which was then the chief city in this valley, is now the city without a district, old Bao-an-tchow.† 60 *li* to Siuan-hua-fu, called by Tchjan-de-hoi, Siuan-de-tchow.‡ The "stone staircase" is doubtless a road cut through the stone ridge which is called the "Dragon's back." 60 *li* to Tchjan-tsyakow,§ or Kalgan. The defile of Kalgan, under the name of De-shen-kow, became chiefly known in the 14th century, under the dynasty of Ming, when a barter fair was established at its southern mouth, between the Mongols and Chinese. The word Kalgan is not now known to the Chinese. In the old Chinese-Mongol dictionaries, the word Khalga means the same as Guan-kow, that is, "the mountain passage," especially one fortified by nature or art. Consequently it is easy to recognize this Mongol term in the word *Kaluga* (corresponding to the word of like signification *Derbend*), as some mountain defiles are called in Western Turkistan.|| Ehu-lin otherwise Ye-hulin,¶ is the old designation of the boundary range between Mongolia and China, which is now called Inshan, "Northern Mountain," or Tsin-shan, "Blue Mountain," and of the interior of the Hingan range. Among the Chinese geographers, some trace its beginning from the "Celestial Mountains," Thien-shan; others consider it the eastern extension of the mountains of Kuen-luen. In fact, it begins with the mountains of Ala-shan near the Ordos, and goes eastward to the boundaries of Mantchuria.

(*) Station Bolo, probably a Mongol name, was evidently the first in Mongolia from China. Post-roads were established by the Khan Ogotai. The post-road from the boundaries of China went to the place Yu-err-li. Further on it united all the so-called four great Hordes [*Ordos*] or residences of the Mongol Khans. Yu-err-li was probably the Southern Horde [*Ordo*]. From here one post-road went to the Eastern Horde, which was on the northern branch of the Urshun River, which unites the lakes Buir and Dalai. Another road went to the river Tola, where must have been the Northern Horde [*Ordo*], and which was the chief one in the time of Tchinghiz Khan. The usual road from the Eastern [*Ordo*] to the western, lies up the course of the river Kerelun. It again unites with the main road from Yu-err-li on the north, where the Kerelun turns to the east. From the river Tola the post-road went to the Western [*Ordo*], Kholin [Holin] or Karakorum, and thence to the possessions of Jagatai and further.

Tchjan-de-hoi went to Yu-err-li and the Kerelun, and thence to Tola, and from Tola to Kholin, and finally to the residence of Khubilai.

(*) Fuchow must be looked for in the ruins of the town Khara-balgasu. It is evident from the ruins that this was a city fortified in the Chinese way, with a ditch, a wall, and batteries. On the north-western corner is a prolongation for eighty paces, ending with a high *obo*. From the top you can see over the steppe for a great distance. Here, probably, was the look-out tower. Inside the wall on the north-east is a special wall. There stand the remains of the table of sacrifice.

* *Yan-Ho*, and *Sang-kan-Ho* of our maps. Their junction forms the Hun-Ho or Yung-ting-Ho, flowing under the bridge of Lu-kyu (the *Pulisanghin* of Marco Polo), about 7 miles west of Peking.—*Y.*

† *Pao-ngan-chau*. The old name is given by Bretschneider as *Te-hing* (= the *De-sin* of Palladius).

‡ Sindachu of Marco Polo; the Siuan-hua-fu of Bushell, *Siuan-hua-fu* of maps.—*Y.*

§ *Chang-chia-kou* (Bushell); *Tchang-kia-kheo* (Klaproth).—*Y.*

¶ The famous "Iron Gate" north of Oxus, between Termed and Shahrsabz, described by Hwen T'sang and by Clavijo, is often in maps called *Kohluga*, a word which I have never before found explained.—*Y.*

¶ This is written in the itinerary of Kiu-Ch'ang-Ch'un, translated by Bretschneider, as *Ye-hu-Ling*.—*Y.*

Water is brought into the ditch from the stream which runs close by. The empty town presents heaps of ruins, and is all overgrown with grass. Under the Mongol dynasty this town bore the name of Siu-he-tchen,* when it was renewed, and it kept this name until the dynasty Ming. It was also called "Little Peking." With the constant incursions of the Mongols, the Mings at last lost it. The Mongols have a tradition that Khara-balgasu was occupied by Burni and Galdan, the defenders of Mongol independence, in their struggle with the Mantchus (*Notes during my Journey in Mongolia in 1859*).

(*) The Tchan-tchjow of Chinese history must be the present town of Tsagan-balgasu.† Inside it are many ruins. There is a stone monument, which from the lapse of time has almost entirely sunk into the ground. See the plan of Khara-balgasu and Tsagan-balgasu, made under the direction of Mr. Turbin.‡

(*) The wall exists at present. "On the 25th of June, I left Tsagan-balgasu, near which we had encamped. We went 25 versts by the side of long hills. Farther were seen chains of little hillocks, which, at a distance, seemed considerable mountains. Near them, 7 versts from the station, on going into the mountain valley, we noticed an old wall which extends from east to west. The Mongols who accompanied us called this wall *Moh-herme* [*Mau-khäräm?*], that is "the Bad Wall," in opposition to *Tsagan-herme*, that is "The White (and Great) Wall." They affirmed that it goes east as far as the sea. All the space about the wall was full of large holes. It is probable that this wall constituted the *Min-tchan* boundary, so-called from the name of the Emperor *Min-tchan* (1190 to 1195), who made here a line of defence against the incursions of the Mongol Hordes§ (*Notes of Travel in Mongolia in 1859*).

(*) It is hard to follow the traveller further. Going along the post-road at that time, he perhaps followed the easternmost of the present roads from Kalgan to Urga. Besides that, the distance of his day's journey is uncertain. It may have been, as at present, from 50 to 80 *li* or 25 to 40 versts. What he says about going six stations through thick drifting sand is not in accordance with the latest observations, and we must either not take his words literally, or else consider that the face of the country has changed.||

Mongolian steppes in Chinese works are called without distinction, *Gobi*, *Han-hai*, *Shamo*, or as the writer has it, *Shato*, but the more careful geographers give the name of *Shamo* to that sandy strip of steppes which goes from the boundary of Mantchuria to Lake Lob-nor.

(*) *Yui-err-po*, otherwise *Yui-err-li*, is a Chinese name, and means "Fishy Lake."¶

By "the Princess," the traveller probably means the Princess Ghin, who was given in marriage to Tchinghiz Khan, or, perhaps, to one of his successors. According to Mongol custom in each of the four great [*Ordos*] there lived one of the khan's wives. In the palace at *Yui-*

* *Hing-ho-cheng* or *Kara-Hotun*, of Bushell, about 40 miles N.W. of Kalgan.—*Y.*

† It is the *Pai-cheng-zu* or *Chagan Balghasun* (both meaning "White City") of Bushell and others; and is, undoubtedly, the *Chagan-nor* of Marco Polo, one of Kublai Kaan's summer residences.—*Y.*

‡ One would be glad, indeed, to see the said plan! but how, when, and where?—*Y.*

§ *Ming-ch'ang*, in Bretschneider. This rampart is mentioned by Timkowski (I. 263). He mentions another near Chaghan Balghasun, further south, and one near Kara-tologoi, further north.—*Y.*

¶ But the traveller scarcely does speak of going six marches "through thick, drifting sand." Timkowski, on the eastern road, speaks of sandhills and sand willows, and says, under November the 7th—"The greater part of our road from the 23rd of October to this day was invariably sandy" (I. 254).—*Y.*

¶ Bretschneider identifies this with a lake in about 43° 50', called now by the Chinese *Po-yü-rh Hai*, meaning the same, and by the Mongols *Tur Nor*. I have no map that shows it.—*Y.*

err-li, there was, perhaps, the khan's wife of the Chinese house.

The description of the palace recalls the ruins of Olon-baishin near the stony belt Busyn-tcholo. The similarity is striking, but these ruins are further north (from the station Ude 140 versts to the north-west), and if there is no mistake in the enumeration of the day's journeys in the traveller's diary, it is impossible to recognize Olon-baishin as being Yui-err-li.

"The ruins of Olon-baishin are placed to the north of the stone belt on the slope of a hill near the marshy traces of a lake which existed here. The place is surrounded by heaps like mounds, covered with huge bricks, or cut-stone slabs which were used together with bricks. The bricks are burnt black. Everywhere are strewn remnants of green pottery and bricks of various kinds. Everywhere Chinese architecture is noticeable. The chief building must have been that which had constructions on both sides, called in Chinese *err-fan* (ear rooms).

"Behind it there are remains of a building surrounded by a gallery. In front of the building a platform is raised, under which is seen a vault which goes down deep under the floor of the hall. In a line with this building to the east is another similar one, but without these additional constructions. On the west there is also a hall. In front of it there is an entrance called by the Chinese *Tchuan-tan*. Further to the south there rises a great heap of ruins, probably a tower, the height of several fathoms. Both on the east and west there is a similar building in a line with the main one. Besides this there is a quantity of small ruins and little towers in full preservation with vaults, and some with *fokans* or niches for idols. Beyond this group of ruins on the east are others, and one of them is very remarkable. On the west is another small hill, on the top of which are also ruins. In front, on the south, not far off, is the limit of Busyn-tcholo, in places planted with elms. They say that the brother-in-law of the Chinese Emperor lived here, meaning him by the name Hun-tai-tsi [Khung-taidzi].

"We were unwilling to leave the silent monuments of settled life, the remnants of those times when these steppes were not so unpeopled and unfruitful. From the north we came up to the top of the range Busyn-tcholo, where all the valley opens up before our eyes, shut in by low hills. The traces of the lakes shine in spots. Small sandy elevations in the green valley are noticeable from the clusters of acacia which bind together the soil. The slope to the valley is gentle on all sides. The valley is very large" (*Notes of Journey in Mongolia in 1859*).

(*) It seems probable that this is the mountain now called Tono: the Kerelun running from the north makes a semicircle about it so as to turn to the east.

(†) In Chinese *tu-err*. This is the river Tola. The traveller evidently did not cross over it, and went along its southern bank. He arrived at the Tola perhaps in that place, where even at present the caravans from the south pass.

(‡) This town cannot be far from Urga. The Kidans [Khitans] of the 10th and 11th centuries left traces of their rule in all the countries which touch China on the north. Ruins of their fortifications and towns are met with not only on the Tola but on the Kerelun, and in Mantchuria.

(§) These were workmen of various trades, from China and Turkistan, who were settled in the north-western part of Mongolia by the Mongols.

(||) Tchjan-de-hoi speaks of the roundabout way, which was, perhaps, more convenient than the one straight to the west, which probably went over the mountains by the side of the lake.*

* I do not understand this note of Father Palladius. This lake, *Vuvuge-Nor*, from which went a road S. W. 100 li to Holin or Karakorum, is the Ugei-Nor of Mr. Paderin (see *Geographical Magazine* for July last, p. 138). And the Khitan town at Khadassan of Mr. Paderin corresponds to Bilihedu of the text.

(13) Here was Karakorum. The author, for some reason or other, does not go into details about this residence of the Khan's, and apparently remained in it but a short time, as he was hastening on to the residence of Khubilai.*

(14) Tami is evidently the present Tamir. It is strange the author does not speak of the Orkhon, since Karakorum was on it.†

(15) It is difficult to say what is the river Tangu without geographical data with regard to these little-known places. In any case there is no river there which flows from the Tangut province, Sisia [Si-Hia] (in the north-west part of China Proper). Probably the author was led into a mistake by the name of the river.‡

(16) [A welcome illustration of Marco Polo, who lays so much stress on Kublai's practice in later days of performing this libation with the milk of the white mares, before quitting his summer quarters at Shang-tu for Peking. The period there, however, is given as the last day of the August moon; probably because the journey south could not be deferred to a later season (see vol. i., pp. 265 and 365).—Y.]

(17) [Another illustration (see i., p. 346).—Y.]
(18) [This answers exactly to William de Rubruck:—"On the 9th day of the May moon they collect all the white mares," &c. (see notes to *Marco Polo*, i., p. 272).—Y.]

M. MIKLUCHO MAKLAY IN NEW GUINEA.

From the *Ausland* we borrow the following particulars respecting M. Miklucho Maklay, the Russian traveller in New Guinea, to whom reference has, more than once, been made in our columns.

Miklucho Maklay is about thirty years of age, and was educated first at St. Petersburg, after which he studied medicine at Heidelberg and Jena. He subsequently journeyed through Spain and Italy, and undertook a scientific trip to the Canary Isles in company with Professor Häckel. On his return he devoted himself to studying natural history and anthropology, and visited Abyssinia and the shores of the Red Sea. On regaining St. Petersburg he attracted the notice of men of science, and, thanks to the influence of the Grand-Duchess Helen, was supplied with the means for a journey to New Guinea. Maklay was attracted to Astrolabe Bay, a recess in the north-

In the place just quoted the printer has converted the specification of Mr. Paderin's arrival at Ugei-nor on his eleventh march (or day's journey) into "the 11th of March."—Y.

* It does not appear that he went to Karakorum at all. We see from Paderin that it lay off the road apparently followed by both travellers.—Y.

† Surely the river *Holin* is the Orkhon? The mountains called *Horse's Head* and *Red-Ear* still bear those names (*vide loc. cit.*, pp. 137 and 138).—Y.

‡ Apart from the misconception about Tangut, the general topography seems tolerably clear, after tracing Mr. Paderin's route. The "Black Signal" must be somewhere about his *Kuren* (on his 17th day's march in the itinerary given, *u. s.*, p. 137), and the *Tan-gu* River flowing north-east must be one of the tributaries of the Selenga, touched or crossed by Paderin; such as the *Khanui* or the *Chilutu*. The high range of mountains west of this is that shown as *Kangai* on the sketch map which I have attached to the account of Paderin's journey, and which forms "the watershed which divides the basin of the Selenga from that of the Dzungarian lakes" (*ib.*, p. 137). This range is represented as a prolongation of that called by the Mongols *Tannu-öla*, which may possibly have to do with the name *Tan-gu* and the mistake about Tangut. And Prince Kublai's summer residence in those days, before he had moved eastward to "Xanadu" and "Cambaluc," must have been on the southern slopes of the range, somewhere near where Paderin crossed it on his way to Ulussutai.—Y.

east coast of unknown dimensions, which had been discovered in 1825 by the French Admiral, Dumont D'Urville, but which he had not had time enough to examine. Here Maklay hoped to light upon aboriginal Papuans of a purer breed, noticeable for a peculiar type of cranium and for curly hair. Through the help of the Grand-Duchess he obtained a free passage on board of the screw corvette 'Vitäs,' and left Russia on the 27th of October 1870. After doubling the southern extremity of South America, the Pacific was crossed, and at Samoa, one of the Navigator Islands, Maklay obtained the services of a Swede named Wilson and a Polynesian lad as servants. In September 1871 the corvette entered Astrolabe Bay, in New Guinea, and found that it extended for about 8 miles only inland. At the further end a protecting row of breakers formed a harbour, and Maklay, accompanied by his two servants, sprang, unarmed, into a boat, and was quickly rowed to shore. In spite of his friends' earnest dissuasion he penetrated into the forest, whither the natives had fled in terror, but it was not without difficulty that he prevailed upon two to accompany them, and those, on coming in view of the vessel set up such a shrieking that he was fain to let them go. A neighbouring village was quite empty; all the inhabitants having taken to their heels. The place, however, seemed to please Maklay, and a space having been cleared of the ironwood and other trees encumbering it, a hut was erected for him, and at the end of a week everything was ready, not forgetting a series of mines round the hut, which could be fired from the outside in case of a seizure of the premises during the absence of the tenants.

A few days afterwards, at daybreak, a procession of natives came down to the shore and brought some presents, including a dog and a porker, some bananas, cocoa-nuts, sweet potatoes, and other fruits. This token of friendship was accepted by the Russians, and in return they deposited some pieces of red calico, pearls, gold paper, empty bottles, buttons, and similar articles. But though the savages returned to bring fresh presents, they forbore, with a delicacy which would be incomprehensible among civilized nations, to touch the Russian gifts. On one occasion some of the ship's officers fell in with some natives, and after pacifying them, made them understand by gestures that Maklay proposed to remain in the country, to which the men replied that he would be eaten if he did so. The villages were then visited, and endeavours made to come to some arrangement, but in vain, for the inhabitants had all decamped. Maklay related subsequently that these domiciliary visits were the cause of much unpleasantness being shown to him, for in that country there are neither locks nor doors, and it is reckoned an unpardonable affront for even a father to cross his son's threshold in his absence.

The day of departure now drew near, and on the 9th of September, Maklay, after attending divine service on board, bid farewell. A salute of twenty-one guns was fired, which drove off the natives to the mountains, from whence they dared not emerge for days, and the corvette sailed away, leaving Maklay in a very shaky state of health.

A year passed by and nothing was heard of Maklay, till, in September 1872, an English journal announced that a whaler had visited the bay and had seen no trace of him or his hut. This piece of news alarmed his friends in

St. Petersburg, and the ship 'Izumrud' (*i.e.* 'Emerald') was despatched in search. An officer who had been on board of the 'Vitäs,' accompanied the expedition, but no sign of Maklay could, for some time, be seen. Suddenly an officer spied through the glass a Russian flag on a tree, and exclaimed that Maklay must be alive. The ship was accordingly brought inland, and Maklay was soon discovered sitting in a canoe with three natives. A boat was put off and he was brought on board, and then, for the first time, the Russians saw the deplorable condition of their countryman. Though young in years, he appeared as weak and tottering as an old man; his face was seamed with wrinkles, which bespoke his sufferings and ailments; his body and limbs were in wounds, and his clothing in rags. He was forthwith provided with necessaries, and enquiry was made for his servants. Maklay replied that the boy died three months after their arrival, and that Wilson was then lying almost at the point of death, he having rallied slightly on being told by the natives that they saw smoke issuing from the sea, and being assured by Maklay himself that it must be a Russian vessel. Wilson was of course fetched on board immediately, and every care taken of him.

For five days the 'Izumrud' lay at anchor, and several natives, with Maklay for an escort, mustered up courage to visit her. In deference to the Russians they appeared in European garb, but their costume created much amusement. For instance, one appeared in a cocked-hat and sailor's shirt; a second preferred his traditional nakedness, while a third lent striking variety to the group by figuring with nothing on but a highly-ornamented, old-fashioned, officer's tail-coat. The visit, however, went off pleasantly enough, and the Papuans returned dancing and singing to their homes. A little misunderstanding was unluckily created on the occasion of a second visit, by the sudden appearance on the scene of a live ox which was kept on board. The horns of the beast struck the most abject terror into the breasts of the Papuans, who immediately sprang overboard and swam to land. Before the departure of the vessel, however, they brought their wives and children, and showed the Russian officers their villages and houses. On the day of departure they entreated Maklay to return soon to them, and on his being compelled to refuse, set up a sort of funeral dirge, accompanied by drums—an honour of an exceptional character usually paid to deceased chiefs.

Maklay related that the same day that the 'Vitäs' left, the savages surrounded his house in great numbers, and with loud cries, keeping outside the circle of mines. On his pursuing his avocations, however, as if nothing was the matter, they began to disperse. His first overtures of friendship were made in the vicinity of his house (which he durst not leave for fear of being plundered), and after an exchange of cocoa-nuts, sweet potatoes, and pieces of roast meat, for strips of red calico or sham pearls—knives and articles of greater value Maklay only parted with on very rare occasions for large accessions to his collections. He then visited their villages, having previously signified his approach by a shrill whistle, which gave them time to conceal their women and children.

After three months Maklay had the misfortune to lose his boy, and being unable to dig a grave for him, the body was put into a sack, and with a large stone tied to

it, consigned to the deep. He was anxious that the Papuans should not see this, as they would no doubt imagine that he had killed him. It was a dark night that he chose for the task, but he could nevertheless descry a large number of natives at a distance, engaged in fishing by torchlight, but the report of a gunshot effectually frightened them away.

With reference to the manners and customs of the Papuans, Maklay makes mention of music, song, games, and dances as forming an important part of their festivals, and of the rites attending funerals and marriages. In December, when the fruits ripen and everything is in abundance, a grand festival lasting several weeks is held. The sight of 500 or 600 men, each bearing his own stock of fruit, his musical instruments and weapons, and decorated with gay feathers, is very picturesque. At night-time an open space is chosen, and a huge fire lit in the centre. Round it group themselves a number of men with instruments; outside of them a second line with weapons of various sorts, then come the women, and, outside of all, the children. They then commence dancing, and continue the same for several hours till overcome by fatigue. Song then commences, and the sport goes on till morning. Their musical instruments comprise large and small drums (some, which are 10 to 12 feet in length, can be heard on a calm day at the distance of 4 or 5 miles), horns, whistles, species of harmoniums, made by joining together a number of bamboos, and conch shells.

Except during these festivals the natives lead a very quiet life. Strangers are hospitably treated and dismissed with presents. The occupation of the men is hunting, fishing, and preparing weapons; that of the women tilling the ground, gathering wood, and looking after the house. Fish are transfixed by arrows, in the shooting of which, as well as of lances, the Papuans show great dexterity, being able to drive a lance 2 inches deep into a tree at 40 paces.

The wild boar are hunted down by setting fire to the jungle around them and spearing them as they rush out. Hunting is followed by a grand feast, after which sham fights between two sections of a tribe are not unfrequently got up. The only vegetable which requires cultivation in this productive country is the sweet potato or *taro*.

The Papuans have a curious custom of preserving the lower jaw of skeletons and throwing away the upper portion of the skull. Maklay was thus unable to get perfect craniums, which he was especially anxious to obtain for Professor Baer of St. Petersburg; but Dr. Meyer, in his recent travels in the west of the island, has been more fortunate, and he will thus very probably be able to throw light on the ethnology of some of the races.

Maklay has rendered important service to future travellers by compiling a vocabulary of no fewer than 800 Papuan words, of the correctness of which he has fully satisfied himself. They can only count up as far as six, and in some villages in the interior three is the limit of their arithmetic.

The great mistake in Maklay's arrangements had been want of forethought as regards provisions. The officers of the 'Izumrud' had left him with a stock for three months, but during the year of his sojourn he was so often down with fever that he could not replenish his stores by hunting. Salt and tea both ran

short and proved a great loss, though he found a substitute for the former in the ashes of drift-wood thrown up by the sea. A more serious calamity was the diminution in their stock of quinine, which Wilson, the Swede, continually stood in need of. On the arrival of the ship they had both run completely out of this indispensable medicine.

From New Guinea, Maklay journeyed to the Moluccas and the Philippines, thence to China, where Wilson was landed; from thence on to Batavia, where, in May 1873, he settled down in the Viceroy's town to recruit his health and arrange his collections. Towards the end of that year the Dutch Government began to make arrangements for an expedition to New Guinea, and Maklay hoped to join it, but the war in Achin unfortunately put a stop to the scheme. But Maklay has not been deterred from his determination to revisit the island. When Captain Moresby visited Macklay at Amboina, in June last, he found him in a most deplorable state of health, but his spirited resolution to prosecute further discoveries were most striking, and could not but win Captain Moresby's admiration. Latest advices state that he determined to visit the Malay peninsula, in November last, where in the interior mountains he expects to find a race called Semang, to which ethnologists have ascribed a Papuan origin.

NEW GUINEA.

In our number for December 1873 (facing page 361) we gave a map of Captain Moresby's discoveries at the east end of New Guinea, made in April 1873, and some account of these discoveries will be found in the report of the Proceedings of the Geographical Society at page 392 of the same number.

We have now to report the additional work done by H.M.S. 'Basilisk,' under the command of Captain Moresby, in 1874. Lieutenant Llewellyn Dawson was appointed to the 'Basilisk,' as surveyor, and she proceeded to the scene of her former discoveries in February 1874. An accurate trigonometrical survey was then made of the east end of New Guinea, and of the islands lying off it. This more detailed examination proved that the true gateway from Australia to China was not the deep strait ("China Strait," on the map) previously discovered, but a much wider passage to the east of Moresby Island. The 'Basilisk' then made a running survey of the previously unknown northern coast of New Guinea, from the eastern extremity to Astrolabe Bay, a direct distance of 450 miles. She was occupied on this service from February to May 1874, and then returned to England. Lieutenant Dawson's trigonometrical survey of the eastern end has been received at the Hydrographer's Office. The first sheet of the northern coast of New Guinea has also been sent in, and the rest will follow in about two months. Captain Moresby will read a paper on his New Guinea discoveries at a future meeting of the Geographical Society; and we do not doubt that he will receive due recognition of the important services he has performed from Her Majesty's Government.

Reviews.

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LIVINGSTONE'S JOURNALS.*

It is now a quarter of a century since David Livingstone discovered lake Ngami and, through the appreciative action of the Geographical Society, became known to the world as an African explorer. When at last he returned to England, some years afterwards, he was famous throughout the civilized world, and the man who had marched from lake Ngami to St. Paul Loando, and thence, across Africa, to the shores of the Indian Ocean, was recognized as one of the greatest travellers in modern times. But he aspired also to be the founder of a new civilization among the tribes he had discovered in the valley of the Zambezé, and in this attempt he failed. He was wanting in some necessary qualifications for such a task, and, in 1864, he returned to England a disappointed man, without the means to resume either the work from which he had been recalled, or his older and more congenial labours. It was then that his true and constant friend, Sir Roderick Murchison, conceived the idea of Livingstone's last great journey, and it was entirely through the efforts of the President and Council of the Geographical Society that the plan for exploring the drainage of Central Africa was matured, that the funds were procured, and that the traveller received consular rank.

Thus, in the evening of his life, was the great explorer enabled to resume the career which was most congenial to him. He went forth alone to die among the people he had loved so well, and for whose welfare he had devoted his life. He landed at Mikindany on March 24th, 1866, and from that day until his worn-out spirit found rest in the swamps of the Bangweolo, seven years afterwards, he continued to wander over the African wilds, influenced by two objects, the desire to add to the sum of human knowledge, and to ameliorate the condition of the African race. From the pursuit of these objects nothing, neither sickness, nor pain, nor hunger, nor poverty could turn him, and in their pursuit he nobly died. But in his last journey of seven years much of his former vigour and force of character were gone. The spirit nothing could change nor turn aside, but the physical power could no longer bear the strain. It is not so much for the value of the geographical results that his journals should be prized, as for the glorious example they furnish of single-minded devotion to a great cause.

Livingstone's last journeys, as regards the exploration of new regions, may be divided into four parts. The first, which occupied four months, from April to August 1866, includes the route from the Rovuma River to lake Nyassa. The second refers to the basin of the Chambezé and the Lualaba, in which Livingstone wandered for twenty-two months, from January 1867 to October 1868, and to which he returned to die in 1873. The third relates to lake Tanganyika. The fourth comprises the twenty-seven months from July 1869 to October 1871, during which he was in the Manyema country.

The first part occupies the first hundred pages of

* *The Last Journals of David Livingstone in Central Africa, from 1865 to his death.* (Edited by Horace Waller, Rector of Twywell, Northampton.) 2 vols. Murray, 1874.

Livingstone's journal; and in some respects it is the most important. It is over an entirely new country through which a route, much used by Arab slave-dealers, leads from lake Nyassa to the sea, down the valley of the Rovuma. Livingstone's own original map of this route was left at Ujiji, and has been saved through the devoted gallantry of Lieutenant Cameron. The mountains to the east of the lake rise to a height of 3400 feet, and are well peopled, the fields being regularly irrigated and cultivated with maize, cassava, tobacco, and English peas introduced by the Arabs. These mountains are described as composed of granite and other primitive rocks, rising up in the form of rounded hills, and they must have a climate which would not be injurious to European residents. So that the use of this route, discovered by Livingstone, may hereafter be the means of extirpating the Rovuma slave trade.

Livingstone crossed the mountains of Muchingwa and entered the valley of the Chambezé in January 1867; but he was not its discoverer. This part of Africa has frequently been traversed by Portuguese traders and explorers, by Pereira, the Pombeiros, Lacerda, Pinto, Monteiro, Gamitto, and others; and it is much to be regretted that Livingstone was only acquainted with the work of his predecessors through inexact references to them by English geographers. For Lacerda was a man of scientific culture upon whose observations reliance could be placed. He was aware of the existence of lake Bangweolo, which, indeed, Pereira had actually crossed;* and he knew that the Chambezé fell into the river which flows past Cazembé's (the Luapula).† In fact his account of the hydrography of this part of Africa is quite correct. Yet Livingstone says—"The Portuguese crossed the Chambezé some seventy years before I did, but to them it was a branch of the Zambezé and nothing more. Cooley put it down as the New Zambezé, and made it run backwards uphill:" and he goes on to say that, misled by the similarity of names and maps, he thought it was an eastern branch of the Zambezé, and that it took him twenty-two months to find out his mistake, the chief Cazembé being the first to throw light on the subject. This is surely the most melancholy instance of waste of time on record; caused by ignorance of former work. Livingstone mentions Mr. Cooley's name as if he was a Portuguese himself, and not the channel through which Livingstone derived his inexact knowledge of the Portuguese work. Had the English explorer read the narrative of Dr. Lacerda he would have known, before he crossed the Muchingwa Mountains, that the Chambezé was not an eastern branch of the Zambezé, but that it flowed west and then north past Cazembé's town, facts which it took him twenty-two months to ascertain. The truth is that Mr. Cooley, in 1845, did show the Chambezé (New Zambezé of Lacerda) flowing in the wrong direction; but he corrected the mistake in 1850.‡ It is on Livingstone's own map of 1856 that this river is made to flow up hill. All this required explanation, and careful editing; or else the passage should have been omitted. One

* *R.G.S. Trans.*, p. 100.

† *R.G.S. Trans.*, pp. 51, 94.

‡ See the review of Mr. Cooley's labours at p. 245 of our September number. We were not then aware that Mr. Cooley had corrected his mistake as to the course of the Chambezé soon after his first map appeared.

very necessary duty of an editor of Livingstone's Journals would have been to explain the exact state of the case as regards both the Portuguese discoveries in the Luapula basin,* of the true character of which Livingstone was ignorant, and Mr. Cooley's position with reference to them. Instead of this the whole subject is left in its original state of confusion, and the editor, endeavours to give the impression that Mr. Cooley left a mistake unaltered, which in reality he had corrected a quarter of a century before. This is but one instance of the careless and inexact way in which the Journals have unfortunately been edited.

Lacerda crossed the Muchingwa Mountains, which divide the basins of the Loangwa and Chambezé, in 1798. Gamitto and Monteiro followed in 1831, and described the magnificent scenery with enthusiasm. Livingstone crossed them in January 1867. Up to this point, and especially as regards the place called Mazavamba on the Upper Loangwa, Livingstone's work fits in admirably with that of Lacerda. He describes the mountains as 5300 feet above the sea, with peaks rising to 6600 feet, and as composed of a beautiful white and pink dolomite. The country, on the northern side, is a succession of enormous waves covered with forests, the ravines containing gigantic timber trees and bamboos. There is considerable moisture, owing to the prevailing winds being from the south-east; and Livingstone tells us of people, in these mountains, living on mushrooms, of which five kinds are considered edible, and ten are rejected. The descent from the mountains to the banks of the Chambezé is through unbroken dark forest, covering a district called Lobisa. The river was crossed some distance to the east of the point selected by Dr. Lacerda, and Livingstone thence travelled north, and, leaving the Luapula basin, entered the watershed of the Tanganyika. The Portuguese, in their journeys, had continued in the basin of the Luapula until they reached Cazembe's town. Livingstone, after visiting Liemba, the southern end of lake Tanganyika, returned to the Luapula basin at Itawa, a point further to the north, in the territory of the chief Insama, whose people he describes as handsome, with European features and finely formed heads. He travelled thence to lake Moero over a country consisting of granite hills covered with trees, 3350 feet above the sea, intersected by beautiful valleys. In November 1867 he reached lake Moero into which the Luapula falls, and which he describes as a wide expanse of water, with sandy beaches skirted by a belt of tropical vegetation, and flanked by ranges of mountains. The lake is 50 miles long and 3000 feet above the sea. He was told that the lofty dark range on the western shore was called Rua (Urunwa of Burton), and that a river called Lualaba flowed out of the north end of the lake. Travelling south, along the east side of Moero, he crossed the river Kalongosi flowing into it, where it was rapid and 60 yards wide, and entered the Lunda territory of which Cazembe was chief, and which had several times been visited by Portuguese traders and explorers. Here he came upon a place where he was told that Dr. Lacerda died. The accom-

plished Portuguese explorer died on October 18th, 1798. The place pointed out to Livingstone is on the banks of the river Chungu, near the point where it empties itself into lake Moero. There is some confusion here, and the journal needed careful annotation, which it has not received. Livingstone's Chama is certainly not the Chama of the Portuguese (Moiro Achinto), the position of which was fixed by Lacerda.

The region between the Muchingwa Mountains and lake Moero appears to be a lofty upland from 4000 to 6000 feet above the sea, with numerous streams and rivers, and morasses which Livingstone calls "sponges," and which, when super-saturated, give rise to inundations. The great lake Bemba or Bangweolo in the southern part of the plateau, seems to be little better than a vast marsh margined by a broad belt of rushes, surrounded by a flat country, and containing low islands of some size, inhabited by fishermen. Lake Bangweolo was discovered and crossed by Manoel Caetano Pereira in 1796, and Dr. Livingstone reached its shores in July 1868, and was paddled over to two of the low islands, called Mpabala and Lifunge. He conjectured the length of this great expanse to be 150, and the breadth 80 miles. Neither Lacerda nor Livingstone ascertained the connection of the lakes Bangweolo and Moero by personal inspection; but both received positive testimony of the fact, about which there can be little doubt. Pereira, however, is said, by Mr. McQueen, to have descended the Luapula in a canoe from lake Bangweolo to Cazembe's, and to have proved the northerly course of that river. The Pombeiro Baptista, in 1806, crossed the river Luapula between the two lakes, at a point where it was 57 fathoms in width; and it was crossed in May 1873 by the returning party of Dr. Livingstone's servants, after his death, at a point close to where it issues from lake Bangweolo.

During the latter part of his sojourn in the Luapula region, Dr. Livingstone was too ill to collect much information, and he prepared no map of his route from lake Moero to Tanganyika. He heard of some strange underground dwellings in the country of Uruwua, and of the rich copper mines of Katanga, but illness prevented him from visiting them. He had fallen in with parties of Arab slave-traders who, when his own resources were exhausted, treated him with the utmost hospitality and kindness. To one of them, Muhammad Bugarib, who accompanied him to Ujiji, he owed his life. This good Samaritan continued his benevolent offices for many months, and indeed Livingstone appears to have been practically the guest of the slave-traders during the journeys that he subsequently made in the Manyema country.

The third portion of Livingstone's work is that which relates to lake Tanganyika. In 1868 he reached the south end of the lake, there called Liemba, which he describes as a deep basin, with sides nearly perpendicular and covered with trees. The rocks are a red argillaceous schist, down which pour several cascades. Large rivers, rising in the same range as the Chambezé, flow into the lake, and on the more level spots round its margin there are herds of elephants and antelopes. The village of Pambete, on the shore of the lake, is surrounded by palm-oil trees. Here Livingstone got a single set of lunar observations which gave him a longitude of $31^{\circ} 57' E.$ The latitude was $8^{\circ} 46' 54'' S.$, that of the north end of Tanganyika

* For a general account of the discoveries of the Portuguese, see *Ocean Highways* for September, 1872, p. 172, and our review of Captain Burton's translations for the Geographical Society, in the number for November 1873, p. 330.

being $3^{\circ} 18' 3''$ S., which gives a difference of 329 miles. Livingstone gives the height above the sea, at Pambete, at 2800 feet.

On the 14th of February 1869, while very ill and under the escort of Muhammad Bugharib, and his slave caravan, Livingstone again reached the shore of lake Tanganyika, at a point on the west coast some distance to the south of Ujiji, and embarked in a canoe on the 26th. His voyage is worthy of close examination, as he appears to have passed the outlet of the lake without knowing it. On the first day, after seven hours paddling, he landed and slept at a place called Katonga. On the 27th, a pull of two hours brought him to Bondo or Thembwé, the shore being rough and covered with vegetation. Here he was delayed owing to a high sea on the lake; and on the 3rd, 6th, and 7th, he touched at places called Toloka, Uguha, and Kasanga island (Kasenge of Burton). The voyage of the 7th took fourteen hours with a head wind. The Kasenge group, consisting of seventeen islets, was discovered by Captain Speke. Livingstone visited two of them, called Kasanga (Kasenge) and Kibizé (Kabizia of Burton). The only remark made by Livingstone, of geographical interest, during his voyage, is that "Tanganyika has many deep bays running in four or five miles. They are choked with aquatic vegetation, through which canoes can scarcely be propelled. When the bay has a small rivulet at its head the water in the bay is decidedly brackish, though the rivulet be fresh; but as soon as we get out of the shut-in bay or lagoon into the lake proper the water is quite sweet, and shows that a current flows through the middle of the lake lengthways." In the following July Livingstone crossed lake Tanganyika on his way to the Manyuema country. He remarks that if it were not for the current the lake would be salt, like the shut-in bays; but this is a misapprehension. The lake is not salt because it has a river flowing out of it. On July 13th he crossed the lake, where it was 30 miles broad, to Kasenge islet, and thence to the western shore. He describes a current as sweeping round this islet from N.E. to S.E. and carrying trees at the rate of a knot an hour in spite of the wind; but he adds that the wind sometimes causes the current to go southwards.

Of the places mentioned by Livingstone, Burton and Speke, on their map, give Thembwé to the south, and the islets of Kasenge, and Kabizia. This group was explored by Speke in March 1856, and is fully described in Burton's *Lake Regions of Equatorial Africa*.^{*} In the nomenclature of the islets, as elsewhere, the carelessness of the editing of Livingstone's journal is inexcusable. The Kasenge of Burton and Speke is given as Kasanga (ii, p. 5), Kasengé (ii, p. 19), Kiséngé (ii, p. 20). Again, in the case of a river in Manyuema, we find *Mabila* at p. 149, and *Machila* at p. 259. After landing, Livingstone crossed the *Logumba* about 40 yards wide and knee deep, which, he says, was running with a rapid current, between deep cut banks, into the lake. Yet a few pages further on, he says that the *Longumba* is probably the outlet of the lake. Then at p. 22, he says that the *Logumba* and *Lobumba* rise in the same hills, the *Logumba* falling into the lake, and the *Lobumba* being the *Luamo*. Again, at p. 154, he says that the *Lobumba*

flows into the lake. There is apparently confusion in all this, due, we suspect, to careless editing.

In November 1871 Dr. Livingstone made his trip to the northern end of the lake, a portion which had already been explored with some thoroughness by Burton and Speke in April and May 1856. The conclusion was the same on both occasions, namely, that the Rusizi River, at the extreme northern end, flows into the lake, Livingstone says, at the rate of 2 miles an hour. His observations had long been valueless, as regards altitudes or distances of heavenly bodies, in which time formed an element, for he afterwards found that, on November 14th, he was 21 days out of his reckoning.*

The fourth and last portion of Livingstone's explorations is comprised in his visit to the region to the west of lake Tanganyika, which he calls Manyuema, in the company of the Arab slave-dealers. During this period he was very ill, and quite unequal to the task he had undertaken. Admiration at the pluck and energy of the brave veteran is necessarily mingled with regret that he should have been exposed to such hardships and trials, when no adequate result was possible. Livingstone describes the country as a succession of undulating hills, covered with forest, and with miles and miles of cassava. The route was generally along ridges of hill ranges, with deep valleys on either side. Many villages were dotted over the slopes, surrounded by gigantic trees. Bambaré, in Manyuema, where Livingstone was detained for so many weary months, is about 160 miles west of lake Tanganyika, and at a lower elevation. Beyond this station there is a beautiful mountainous country. Palm-trees crown the heights, climbers of cable size hang from the huge branches, and strange fruits and birds were observed. It was a newer and more tropical country than had yet been seen. The people cultivate largely, and the soil is rich, but each village is at war with its neighbours, and there is no general government. The country is drained by a river called the Luamo, which was 200 yards wide where Livingstone crossed it. In 1870 he made a journey due north, through dense forest and rank jungle grass, in pouring rain, and describes a living vegetable bridge over a river, consisting of glossy-leaved grass closely felted together. His slave-trading companions pushed still further to the north, and reached the Balegga Mountains, the position of which has been already discussed in this journal.† In March 1871 Livingstone, in company with another gang of slave-dealers, reached a place called Nyangwe, on the banks of a great river, which he calls the Lualaba, and conjectures to be the same as that which (he was told) flowed out of lake Moero. He also heard of a large lake between Moero and his position at Nyangwe, called Kamalondo. He describes the river at Nyangwe as 800 yards broad, and with a depth of from 9 to 20 feet near the banks. Here a great *chitoka*, or market, was held, and the Arabs, apparently to strike terror, committed a horrible massacre among the market people. This was followed by Livingstone's retreat, who was mistaken for one of the slave-dealers, and attacked from ambuscades on his march. He returned to Ujiji on October 23rd, 1872.

* *Royal Geographical Society's Journal*, xxix., p. 245.

* Vol. ii., p. 169.
† *Ocean Highways*, November 1872, p. 246.

The most remarkable fact in natural history, observed and recorded by Livingstone, is the existence of large anthropoid apes, called *soko*, so near the eastern coast of Africa as the Manyema country. The range of the chimpanzees southwards is believed to terminate with the Congo, but Dr. Schweinfurth has already reported their occurrence as far to the east as the Niam-niam country, and the upper waters of the Bahr-el-Ghazal; and Antinori and Piaggia also mention having heard of them in the same region. Dr. Sclater, in a former number,* showed that they were not confined to the West Coast, but that they were met with, in dense forest, between 5° N. and 5° S., and as far into the interior as 29° E. longitude.

After his Manyema expedition Livingstone, as is well known, returned to Ujiji, went thence to Unyan-yembe, and then set out alone on his last fatal journey. We ought not to regret that the great explorer should thus have sacrificed his life, for the whole of it formed a bright example of unswerving devotion to a noble cause; and the mode of his lonely death, in the midst of his discoveries, was its very fitting conclusion.

One great cause of congratulation is that the maps and journals arrived safely in England, after so many risks and dangers. The larger portion of the journals, copied out fairly, was sent home by Livingstone himself, from Unyan-yembe. The maps and other documents were brought from the place of his death, together with his body, in the face of great difficulties, by his brave and faithful negro servants. Their safety is ultimately owing to the disinterested zeal of Lieutenant Cameron, who had reached as far as Unyan-yembe on his way to succour Livingstone, when the body arrived. He supplied the servants with the provisions which enabled them to reach Zanzibar. He also himself pushed onwards to Ujiji, and saved two pocket-books, and another important map.

It is unfortunate that these valuable documents should not have fallen into more competent hands. It was most important, both to the memory of Dr. Livingstone himself and to geographical science, that a learned and careful editor should have been selected. The notes were jotted down in pocket-books and even across scraps of newspaper. No word of explanation, no wish could any more be added by the writer—all must be trusted to the learning, the good feeling, and the loving care of the editor. For there was much to explain before these journals could be appreciated by the general reader. There should have been concise but comprehensive accounts, in their proper places, of all that was previously known of the Rovuma, of lake Nyassa, of the Portuguese journeys through Cazembé's country, and of lake Tanganyika; and there should have been footnotes explaining many points, and referring the reader to all previous mention of the various peoples and places. Instead of any commentary of this sort, which was very necessary, we are introduced to a new method of editing which we trust will be the last of its kind. The footnotes are confined to such pieces of information as that *bhang* is a species of hemp! or that a *dhow* is a vessel of the Indian Ocean, while the editor's chief work consists of remarks inserted throughout the two volumes, at very frequent intervals, in the same type as the journals, with nothing to distinguish them but small brackets. These remarks often inter-

fere with the thread of the narrative. Thus, when the reader is in the midst of Livingstone's interesting account of the descent from the Lokinga Mountains, he suddenly finds himself plunged into a notice of Messrs. Lewin and Co.'s commercial transactions in beads, and he becomes aware that the editor has forced himself to the front. Again, when following with close attention the brave explorer's advance into Manyema, he is interrupted by two pages of statistics on the ivory trade, intruding, in the same type, between the author and his reader. This is tiresome enough, but the frequent interruptions become seriously objectionable when they take the form of telling the reader what passages he is to admire, and at what particular points his sympathy or admiration are to be excited. For instance, when Livingstone writes a few earnest lines on the spirit of missions, the reader is not allowed to peruse it in peace, but must first be stopped by an introductory platitude from the editor. This sort of thing at last becomes a serious annoyance, which is increased by the way in which the most ordinary editorial duties are set on one side. Thus Livingstone is made to say that he saw "a species of *Ficus Indica*."* He may have seen a species of *Ficus*, or a variety of *Ficus Indica*, but such simple corrections as these have been neglected throughout. The work is not provided with an index, which is a serious drawback; and the journals have not been collated with the previous letters of Dr. Livingstone, which have been published in the *Proceedings of the Royal Geographical Society* and elsewhere. These letters contain several particulars, some of them of considerable importance, which are not found in the journals as now published. For instance, we find no allusion in the journals to the lake into which the Lualaba falls below Nyangwe. The consequence is that the present publication does not even represent all the information that has been received from Dr. Livingstone, and is thus an incomplete record of his labours.

The great editorial fault, however, is one of omission, and one which Dr. Livingstone would have regretted. All the world knows how much the great explorer owed to Sir Roderick Murchison, and how deep was the friendship between the two men. If Livingstone had lived it cannot be doubted that any book he published would have contained an expression of that friendship, and some account of the action taken by Sir Roderick and the Geographical Society, in originating and maturing the expedition. Yet it will scarcely be credited that the name of Murchison is not once mentioned, either in the introduction, or in any one of the numerous notes in the text. The venerable President of that Society, with which Livingstone's labours were so intimately connected, is entirely ignored, as is the Society itself. It is beyond the power of Mr. Waller to efface the memory of that connection, or of the friendship between Murchison and Livingstone, and in proof of this our review cannot end better than with the touching sentence which Livingstone wrote, when he heard of Sir Roderick's death: "Alas! alas! This is the only time in my life I felt inclined to use the word, and it bespoke a sore heart: the best friend I ever had—true, warm, and abiding—he loved me more than I deserved: he looks down on me still. I must feel resigned to the loss by the Divine Will, but still I regret and mourn."

* See *Ocean Highways* for November 1872, p. 241.

* Vol. i., p. 242.

THE DUTCH NORTHERN COMPANY.*

ON the 24th of July 1873, a Gold Prize Medal was awarded, by the Provincial Utrecht Society for Arts and Sciences in the Netherlands, to Mr. S. Muller, Fz., for his history of the Northern Company, written in answer to the following prize question: "A historical review of the Dutch discoveries in the Arctic Regions, and of their establishments on some points, especially on Spitzbergen, and also of the international disputes of the Republic of the United Provinces with England, Denmark, and Sweden, about the navigation and fisheries in the Northern Seas."

Mr. Muller's book, published by the above-named Society, does not give a full answer to the first part of the prize question, because it deals only with the Dutch discoveries up to 1642, and with the difficulties of the Northern Company during the time of its existence from 1614 till 1642, when the whale-fishery consisted only of what was called the shore-fishery. During that first period few discoveries were made. Generally the ships went in May straight to Jan Mayen Island and the west coast of Spitzbergen, principally to Smerenburg on the Amsterdam Island at the N.W. corner of Spitzbergen, where they stayed till the end of August to catch "whales and other monsters," which were at that time very abundant there; but which, after a few years of havoc and slaughter, were frightened, and at last nearly disappeared from those places, where the company had, or pretended to have, exclusive fishing rights. For this reason the whalers were obliged, after 1642, to follow the whale, and to search for him in every corner of every island, and at last in the open sea and in the ice.

This was the second whaling period, beginning in 1642, and continuing till the end of the 18th century. It was during the latter period that the greatest number of Dutch Arctic discoveries were made, which have been laid down by the two Van Keulens in their charts.

The Provincial Utrecht Society asked for a historical review of all the Dutch discoveries in the Arctic Regions, and not only of those made before 1642. Therefore, we may look upon Mr. Muller's book as being the first part of the answer to the Society's prize question; but, notwithstanding this, and that we hope hereafter to receive from him the second part of the answer, we fully concur in the opinion of the Provincial Utrecht Society that the history of the Northern Company, of which there are no papers found in any of the well kept archives in the Netherlands, has been compiled with much industrious care and patient research, and after a laborious comparison of a great number of MS. State papers with old and modern publications, which have been minutely scrutinized and submitted to an intelligent criticism; and that such a work, by which new light is thrown over a great field of Dutch activity in former times, has well deserved the award offered by the Utrecht Society.

It is a very interesting book, giving a clear insight into all the concerns and motives of action of the Northern Company. In the first place we find, in the introduction, a historical review of all the Arctic discoveries before the 17th century, which we remember so well from the articles in Mr. Clements R. Mark-

ham's "Threshold of the Unknown Region" in *Ocean Highways*.

In the first chapter there is a review of the different Arctic voyages undertaken by the Dutch from 1565 to 1613, of which the principal is that made in 1596 by Barents and De Ryp. The instructions given to Barents by the States General, and signed T. van Oldenbarnevelt, is given in the appendix of the work.

Here we wish to make a simple remark: it is this—We do not believe that either Barents or De Ryp ever circumnavigated Spitzbergen.

To us it is plain that, while in company, they both discovered the N.W. point of Spitzbergen, and came down along the west coast, and that, after returning to the south of Spitzbergen, they separated. Barents went to Novaya Zemlya, and De Ryp tried to penetrate along the east coast of Spitzbergen, and, failing to find a lane of open water, returned to Holland. He did not go round Spitzbergen, as Mr. Muller supposes, and has been erroneously stated by Mr. A. Petermann. In the following chapters we learn much that is exceedingly interesting about the difficulties in getting the Company fairly started, and in obtaining its charter from the States General, only for one year, and then for another year. For the people of Holland, though from the earliest times in favour of free trade, frequently became the victims of some monopoly. We find here some very interesting pages about the struggle between free trade and monopoly, and the arguments by which the States General were convinced of the necessity of granting a longer lease.

The animosities and jealousies with which the Company had to contend, not only from foreigners, but also from the Provinces, and even from the different towns in Holland, are portrayed in vivid colours, and show that the awakened spirit of enterprise, in the 17th century, was so strong that no difference was made between competitors. They were all, in the eyes of the monopolists, one as bad as the other, foreigners or fellow-countrymen.

During the whole period of its existence, the Company had to struggle for life, not only with arms, but also by the exercise of great diplomatic skill. When at last, in 1642, the Company had distanced all competitors, the whales disappeared from the shore where the Company had, or pretended to have, exclusive rights, and all its efforts, conducted with unflinching determination, came to nothing, because the whale no longer came near its establishments on shore, but was only to be found in the open sea, where monopoly was destroyed by free trade.

The period in which the Northern Company flourished was one of great national activity in Holland. It opened a new and excellent school for sailors, navigators, and naval men, who, among the ice-fields in the Polar Regions, acquired all those manly qualities which enabled them to fight so many gallant actions, and to give to the flag of the Dutch Republic such high renown.

We hope that Mr. Muller will continue a work which has been so well commenced, and that by so doing, and by laying before his countrymen a picture of the patient perseverance and great energy of their forefathers, he may reap the satisfaction of seeing them once more in the Arctic Regions, co-operating with other nations in that field of scientific research.

* *Geschiedenis der Noordsche Compagnie*, door Mr. S. Muller, Fz., Witgegeven door het Provinciaal Utrechtsch Genootschap van Kunsten en Wetenschappen Utrecht, 1874.

MR. MARKHAM'S BLUE BOOK ON INDIA.*

THERE is a narrow-minded class of public officials to whom Statistics consist merely of a tabular or numerical statement bearing upon any subject whatever, and not a comprehensive and lucid exposition of all those facts and conditions which bear upon the present of the State and its chances of future development. Persons of this turn of mind cannot be urged too strongly to devote a few spare hours to an examination of Mr. Markham's *Statement exhibiting the Moral and Material Progress and Condition of India during the year 1872-3*. They will then find that statistical statements can be interesting, without detriment to their instructiveness, and that mere numerical statements, though indispensable, are not by themselves sufficient to convey a true idea of the nature of a country. The unpopularity of our Blue Books is due, in no small measure, to the fact of their containing merely figures, without any explanation of the method by which they have been obtained, or of their bearings upon the subject they are designed to illustrate. Certainly, in number and bulk, our Blue Books leave nothing to be desired, and exceed any similar collection published abroad, but to a great extent they are mere accumulations of indigested facts, promiscuously collected, and leave us in the dark with reference to many subjects of the highest interest and importance. We feel sure that a summary statement exhibiting the Statistics of the United Kingdom, and accompanied by a series of tables prepared in an intelligent manner, would prove acceptable to many who, at present, hesitate before they involve themselves in the ill-arranged arrays of interminable figures printed for their special benefit at the expense of the tax-payer.

Mr. Markham's work enters into nearly every subject of statistical inquiry, and his remarks on the land-revenue and other subjects bearing upon the material and moral condition of the people are particularly interesting. The volume, as usual, is illustrated by a series of capital maps, amongst which that of the Trade routes to Tibet, by Mr. Saunders, will prove particularly interesting, as it shows for the first time the route surveyed in 1871 by Major Montgomerie's 'Asiatic.' A series of Statistical Tables, prepared by Mr. C. E. D. Black, forms an appendix to the work. Statesmen and others desirous of obtaining a knowledge of India and Indian affairs cannot do better than devote a few hours to a perusal of this most interesting of Blue Books.

E. G. R.

THE GERMAN ARCTIC EXPEDITION.†

We reviewed at some length the German edition of this work in our numbers for April 1873, p. 24, and May 1874, p. 75. On the first occasion we noticed the first volume, and gave an account of the drift of the 'Hansa,' of the proceedings of the 'Germania,' and of the contents of the work which records them; and on the second we reviewed the botanical and zoological results of the expedition.

* *Statement exhibiting the Moral and Material Progress and Condition of India during the year 1872-3*. By C. R. Markham. Presented pursuant to Act of Parliament. Folio, pp. 254., 16 maps. London, 1874.

† *The German Arctic Expedition of 1869-70, and Narrative of the Wreck of the 'Hansa' in the Ice*: by Captain Koldewey, Commander of the Expedition, assisted by members of the Scientific Staff. (2 vols. 8vo. Sampson Low and Co.)

We now welcome the appearance of an English version of the first portion of the German work, in two volumes, containing the narratives of the loss of the 'Hansa,' and of the proceedings of the 'Germania' in winter-quarters, and during the spring explorations. Messrs. Sampson Low and Co. have done valuable service in giving this interesting narrative an English dress, which, like the German work, is embellished with numerous excellent illustrations, and a good map. The portion of the east coast of Greenland visited by the 'Germania,' was discovered by Captain Clavering in the 'Griper' in 1823, when Sir Edward Sabine visited this region, as well as Spitzbergen, to swing the seconds pendulum. The German explorers made a minute and careful survey of the coast between 73° and 77° N. latitude; and their work is specially valuable as a fixed and well defined base on the east coast, to which, most probably, one detachment of the sledge travellers from the English Arctic Expedition of 1875-77 will direct its march. The publication of the English edition is, therefore, very opportune, as it will be useful to our officers; while the modestly told story of the adventures and sufferings of the 'Hansa's' crew, and of the exploring labours of their more fortunate brethren in the 'Germania' will secure the warm sympathy and interest of English readers.

A RAMBLE ROUND THE WORLD, 1871. By *M. Le Baron de Hübner*. Translated by Lady Herbert. London (Macmillan & Co.), 1874.

ALTHOUGH Baron de Hübner went over well-known ground, *i.e.*, across the United States by way of the Pacific Railroad, from San Francisco to Japan; thence to Peking, Canton, Hong Kong, and so home, the record of his travels is much superior to the writings of average modern travellers. The author, besides being a man of education, is possessed of a penetration and a freedom from prejudice which add considerably to the value of his remarks on foreigners. We were more especially struck with the passages devoted to the philosophical analysis of the American character, in which he draws a picture which though not flattering to our Transatlantic cousins, is infinitely less superficial than the general remarks of English observers on the same subject. Another portion of the book calling for notice is the very full account of the rise and development of Mormonism, a state of society which is represented in far more sombre colours than a certain English author has thought fit to paint it. The chapters assigned to a description of Japan will claim attention on account of the paucity of books of travel in that country, as well as the interesting nature of the subject matter. Before concluding we would speak in terms of praise of the translator, who has performed her duties excellently, and has greatly contributed to render this charming work appreciated at its true value by the English reader.

EIGHT YEARS IN CEYLON. By *Sir Samuel Baker, M.A., F.R.S., F.R.G.S., &c., &c.* New edition, with Illustrations. London (Longmans), 1874.

THE RIFLE AND THE HOUND IN CEYLON. By *Sir S. W. Baker*. New edition, with Illustrations. London (Longmans), 1874.

TWENTY years having elapsed since the publication of the above works, the present editions may almost be looked upon as new books. And in truth the freshness with which are depicted the exciting incidents of sport, which abound in both of these little volumes, might fairly entitle them to be looked upon as a record of but yesterday's experiences. In his preface to the first-named work, however, Sir Samuel is careful to observe that

Ceylon has greatly progressed since the date of the book, and it is clear that the remarks on emigration, irrigation, and the cultivation of coffee, rice, and sugar, and other products, now require modification. But the description of the country, the scenery, the inhabitants, and above all, the hunting cannot but win the reader's attention. The style of writing too is pleasant. Sir Samuel writes much as he speaks, in a plain, unaffected manner, which not a little enhances the attention of his listeners. Our readers will doubtless peruse with interest these early experiences of one whose character owes much, we venture to say, to the course of training described in these volumes and which is so admirably adapted for developing those truly English qualities of decision, pluck, and hardihood which he has shown so unmistakably in his later and greater exploits.

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GUIDO CORA'S "COSMOS."

NUMBER IV—V. of the *Cosmos* opens with an interesting list of Italian travellers who have visited Egypt from the time of Leonardo Pisano (*circa* 1200), down to the Roman expedition, commanded by Captain A. Cialdi and despatched in 1840, to convey to Rome thirteen monoliths and other antiquities offered by Mehemet Ali for the Church of St. Paul, in that city. The official accounts of the Austro-Hungarian Expedition, and an abstract of Captain Prshevalski's travels in China and Tibet next find place, after which, come various notes on geographical subjects, among which may be mentioned a notice of some recent travels in Tunisia, accomplished by a native of Mash-had in Persia, whom the Marchese Doria picked up in 1863, while travelling in that country. This Persian is a youth of singular intelligence and powers of observation, and although he has not, strictly speaking, scientific knowledge, his account of his travels are valuable on account of their extreme accuracy. Signor Cora then supplies us with notices of the meetings of various Geographical Societies held in the early part of this year, and the number closes with an excellent map of the region contiguous to the boundary between Persia and Baluchistan compiled from Major St. John's map and the English Admiralty chart. The article which this map serves to illustrate will appear in the next number.

Cartography.

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Austrian Map of Central Asia.*

THE map of Central Asia prepared at the Military Geographical Institute at Vienna, and just issued to the public, may fairly be described as an enlarged edition of the well-known Russian staff map, first published in 1863, and since then frequently revised.† Out of the twelve sheets forming the Austrian map no less than eight are identical with the Russian original, or very nearly so, but on the four remaining sheets (*viz.* 4, 5, 7 and 8), a great deal of additional information has been inserted, and the map therefore possesses an original value. Khiva and the lower course of the Oxus has been revised in accordance with the results of the late military expedition, but the most extensive additions will be found in portions of Persia, and the neighbouring Afghanistan, and this improvement of existing maps is

* Generalkarte von Central-Asien bearbeitet nach den besten und neuesten Russischen und Englischen Quellen im. K. K. milit. geogr. Institut in Wien, 1874. Scale 1:3,024,000. 12 sheets. 12s. plain, 18s. coloured, single sheets, 1s. 3d. each. (London, Trübner).

† See *Ocean Highways*, 1873, pp. 79 and 120, and *Geographical Magazine*, 1874, p. 350.

due, we believe, to Dr. F. E. Polak, who has travelled a good deal in the countries mentioned.

Having drawn attention to the good points of the map, our duty, as a critic, compels us to point out some of its shortcomings. The map is stated, on the title, to have been compiled from the "best and most recent Russian and English authorities." This assertion is not borne out by a closer inspection, for many authorities, easily accessible and of the highest importance, have been disregarded. The labours of the English missions sent to Kashgar have thus been ignored, and the old Russian delineation of the Pamir is retained; the Trans-Himalayan explorations made by Major Montgomerie's Pandit, though published six years ago, have not been noticed, nor has Captain Ross's journey through Baluchistan (published in 1858). Nor is the transcription of the Russian original satisfactory. We consider it of small importance that the Polish mode of spelling should have been adopted in preference to the English mode, which would have proved more acceptable to the majority of those likely to make use of a map of Central Asia. Far more serious are the errors and omissions of the translator, for many terms and abbreviations have either not been translated at all, or they have been rendered erroneously. The letter "K" is frequently met with, and the reader is allowed to find out that it stands for *kolodez*, the Russian for "well." The terms "See presnoe" and "solenoie," meaning freshwater and salt-lake, occur many times. "Pol." and "Poluos." mean *poluostrof*, peninsula, and "mecz," mechet, mosk. In brackets, behind the name of the fort Aralsk, we find the puzzling term "Uprazd-neunoe," which ought to have been rendered "deserted." "Byw. Ukr." of the map, signifies deserted fort, and M. i Per, on the Jany Darya, are Russian abbreviations which mean "burial ground and dam." In other cases a translation has been attempted, but unsuccessfully. Thus, we find "Friedhöfe" along the Oxus and elsewhere, the translator having taken "Kl.," which stands for "Kliuch," spring, to mean "Kladbitza," church-yard! On sheet 6 we meet with the words "Kani ulan murun Werszina Jancy czana," which ought to have been rendered "Kani ulan muren, upper course of the Yang-tse-kiang," and in the same neighbourhood there is a "Holzweg," road through the woods (in the desert of Gobi!), which ought to have been rendered by "abandoned road."

Maps of Australia.

Mr. HUGHES' map of South Australia* extends to latitude 28° 30' S., and will prove useful for office purposes. In the margin there is a general map of Australasia on a scale of 250 miles to an inch, a map of the Adelaide and Port Darwin telegraph line, on five times that scale, and a plan of the new settlement of Port Darwin and the county of Palmerston, on a scale of 5 miles to the inch.

The telegraph map of Queensland† is hardly more than a rough diagram showing the lines in operation, constructing, or proposed, by straight lines and three classes of telegraph stations. From a table inserted upon it we learn that in 1861 there were 169½ miles of line, and seven stations, and in 1873, 3059½ miles and 73 stations. In the former of these years 5678 messages were forwarded, in the latter 156,268, and up to the 31st of December 1873, 195,206½ had been expended in the construction of lines and stations. This is progress indeed!

* E. S. Wigg and Sons' map of South Australia, compiled and drawn by W. Hughes. Scale 10 m. = 1 inch. Adelaide, 1874. (London, Letts, Queen Victoria Street.) Price £2 2s. mounted.

† Queensland. Skeleton map of Telegraph circuits. Compiled by R. O. Bourne. Scale 27 m. = 1 inch, 1874. (London, Letts.) 10s.

Log Book.

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The Arctic Expedition.—The Arctic Committee, appointed by the Lords of the Admiralty to advise them on all subjects connected with the expedition, consists of Admiral Sir Leopold McClintock, Admiral Sherard Osborn, and Admiral Richards. They have already got through much work, and all the preparations are advancing satisfactorily.

The first and most important point is the decision respecting the complement, and the selection of officers. Captain Georges S. Nares has been appointed to command the expedition. This distinguished officer was a mate on board the 'Resolute' in the Arctic Expedition of 1852-54, when he took an active share in the winter amusements, and did his part manfully as a sledge traveller. He acted in the theatricals, and gave a series of lectures to the men on winds and on the laws of mechanics. In the travelling he was away twenty-five days in the autumn of 1852, and travelled over 184 miles. In the spring of 1853 he was auxiliary to Lieutenant Mechem, and travelled over 665 miles in sixty-nine days. In 1854 he started in the intense cold of March, and went over 586 miles in fifty-six days. He has thus had considerable experience, and will be a connecting link between the former and the present generation of Arctic officers. After his Polar service, Captain Nares was in the 'Britannia.' He has published a valuable work on seamanship. Among other similar services he surveyed the gulf of Suez in the 'Shearwater,' and from 1872 to 1874 he has commanded the 'Challenger' during her important scientific expedition, the operations of which have been recorded in some of our previous numbers.* Captain Nares is now on his way home from Hong Kong.

Commander Albert H. Markham has been appointed as second in command. This officer entered the navy in August 1856, and served for eight years in China, during which time he was present at several actions in the war, and was promoted in 1862 for his gallant conduct in the capture of a piratical junk. From 1864 to 1867 he was a Lieutenant in the Mediterranean flagship 'Victoria,' and from 1868 to 1871 was First Lieutenant of the 'Blanche' on the Australian station. In 1871-72 he commanded the steam sloop 'Rosario' during a cruise among the Santa Cruz and New Hebrides Islands, when he was employed to investigate and report upon the cases of kidnapping, and the murders committed by the islanders.† This difficult duty was performed with tact and judgment, and, after a short service as First Lieutenant of the 'Ariadne' training ship, he was promoted to the rank of Commander on November 30th, 1872. In that year he undertook a voyage to Baffin's Bay and Prince Regent's Inlet, in order to acquire experience in ice navigation, and his work on the subject, *A Whaling Cruise in Baffin's Bay*, contains the latest account of the

operations of the whaling fleet, as well as the memorandum of the scientific results to be secured by Arctic exploration.* Commander Markham has been serving on board the 'Sultan,' in the Channel Fleet, since October 1873, and is now on his way home from Lisbon.

Besides the captain and commander there will be two lieutenants in the advance ship. One of them will probably be Lieutenant Pelham Aldrich, who attained that rank in September 1866, and has since 1872 been serving as First Lieutenant of the 'Challenger.' The other officers will be a navigating officer in special charge of magnetic observations, three sub-lieutenants, a surgeon, an assistant-paymaster in charge, two engineers, and one scientific civilian. In the second ship there will be a commander, three lieutenants, three sub-lieutenants, a surgeon, an assistant-paymaster in charge, two engineers, and one scientific civilian. The scientific staff will be selected under the advice of Dr. Hooker, the President of the Royal Society. Each officer will undertake some special duty connected with the objects of the expedition, and no pains will be spared to ensure successful results. With the exception of three ice quarter-masters for each ship, selected from amongst the most experienced whaling seamen, the crews will consist of man-of-war's men. An experienced Danish dog-driver and interpreter, named Carl Petersen (not McClintock's interpreter of the same name, but a younger man), who was cooper at Upernavik, has also been engaged and entered. The complement will be about sixty officers and men for each ship.

The exploring vessels have already been selected. The first is the 'Alert,' a steam sloop of 1045 (751) tons, and 381 (100) H. P. She is now in dock at Portsmouth, where she will be thoroughly overhauled and strengthened for her encounters with the ice, and fitted with new engines and boilers. The second ship is the 'Bloodhound,' a fine steamer built for whaling, by Messrs. Stephen of Dundee, about two years ago, and bought by the Admiralty. She has also been sent round to Portsmouth to be strengthened and fitted for an exploring ship. The 'Bloodhound' is 160 feet long, with 29 feet beam, and 18 feet depth of hold, tonnage 556 (379). Both the 'Alert' and 'Bloodhound' will receive new names when they are commissioned for the Arctic Expedition.

The Committee has also made progress in the arrangements for ordering dogs and drivers in Greenland, for the preparation of pemmican, and the provisioning and clothing, all on the same liberal scale as in the cases of previous expeditions. The early appointment of the other officers, in order that they may have as much time as possible to prepare for their special duties, is now the most urgent step.

Indian Marine Surveys.—The latest arrangements for the resumption of this important duty (styled by the *Bombay Gazette* the other day "one of the most useful public works which have yet been carried out in this country") may be briefly told. Six trained surveyors of the Royal Navy have been nominated by the Lords of the Admiralty for service in British India, and they will be borne on the books of

* See *Ocean Highways* for December 1872, p. 275; January 1873, p. 311; September 1873, p. 225, and October 1873, p. 271, and the *Geographical Magazine* for August 1874, p. 183; September 1874, p. 225; October 1874, p. 286.

† See *Ocean Highways* for July 1872, p. 111, and June 1873, p. 117.

* See *Ocean Highways* for June 1873, p. 90; for November 1873, p. 309; and for January 1874, p. 424.

the flagship there. Their Lordships have also assented to the transfer of Mr. R. C. Carrington, one of their accomplished draughtsmen, as Civil Assistant to Captain Taylor in the compilation of charts at Calcutta. Staff-Commander J. Ellis, from the East Coast of England Survey, the senior officer of those lent to India, has gone out with Captain Taylor. Navigating Lieutenant Jarrad is to start with Mr. Carrington on the 14th of January for Calcutta. Navigating-Lieutenants Coghlan and Hammond are to join from the West Coast of Australia and East Coast of Africa; Sub-Lieutenant George (son of that veteran surveying officer, Staff-Commander George, who has been for many years Curator of the Geographical Society's maps) and Sub-Lieutenant Petley, from H.M.S. 'Nassau' and 'Maggie.' All are not expected to rendezvous at Calcutta before mid-February, and this delay necessitates a change of programme. Captain Taylor is hastening to Bombay, where he will put officers on board the 'Constance' schooner, and 'Clyde' steam tender, and probably despatch them to survey the new Travankur coffee port of Colachull, then the Paumben Pass, and Coringa Bay. These much-needed surveys can be conveniently carried out by the vessels *en route* to Calcutta. After February strong southerly winds, the precursors of the Bengal monsoon, are a drawback to boat operations along the Orissa coast, and therefore its examination is postponed till November next; but that of the mouths of the Ganges or Megna, including all the shoals and shelter between the Don Manik Islands and the Chittagong shore, will probably be proceeded with by the brig 'Guide' and the schooner 'Lady Lawrence,' till the rains actually begin. When the Bengal monsoon is over, work will be commenced in real earnest with such an efficient staff of surveyors as India may well be proud of, and the wishes of the Chambers of Commerce of all three Presidencies will be duly considered.

It ought to be mentioned that the credit of calling the attention of the Government of India to the importance of a good survey of the Indian seaboard, is due mainly to Mr. A. O. Hume, C.B., the Secretary to the Government of India, at the head of the Department of Revenue, Agriculture, and Commerce, at Calcutta. The fact that these marine surveys will be under that zealous Secretary—who so watchfully attends to the interests of the Great Trigonometrical, the Topographical, and Revenue Surveys of that vast country—augurs well for the future progress of the new Department.

The British Indian Expedition to Yunan.—After the return of Sir Douglas Forsyth's successful embassy to Kashgar, it was decided, if the Chinese Government would consent, to send an expedition from Burmah to Yunan. The Chinese had just given the finishing stroke to the Panthay rebellion, and had no grounds for refusal on the pleas of danger from rebels, or want of authority. They, therefore, readily conceded all that was asked of them, which was passed for a party of four Europeans, and a certain number of servants to cross into Yunan from the Burmese border, to travel within the province, and either to return or to proceed to the sea-coast of China. The head of the mission will be Colonel Browne, one of the deputy commissioners of British Burmah. The second will be Mr. Ney Elias, the eminent traveller and Gold Medallist

of the Royal Geographical Society, who has recently been appointed Assistant Political Resident at Mandalay. A consular officer from China will also be attached to the mission, and the fourth member will probably be Dr. Anderson, who accompanied Colonel Sladen to Momien in 1868; and whose work was reviewed in our number for October 1872, p. 207. There will also be a guard of Sikhs or Gürkhas.

There are only two routes at present in use between Burmah and China. One is by way of Bhamo. The other is the direct road from Yung-chang or Shun-ning through Theinnee to Mandalay. Sprye's route, for through traffic, is entirely abandoned. The object of our Government is to ascertain which of the frequented and practicable lines is the most advantageous. It has, therefore, been decided to take the Theinnee road on the outward journey, penetrate as far as the capital of Yunan, and then return by the Bhamo route, taking Tali-fu on the way. The Shans, under a national chief named San Hai, are in a state of passive rebellion against the king of Burmah to the east and north-east of Thiennee, but caravans pass freely through San Hai's territory, and he is known to be friendly to the British, as well as to the Chinese Government.

Although there will be no discoveries on these routes, still there is a great deal of interesting geographical work to be done, in spite of the fact that some portions of the country have already been surveyed by Garnier. The removal of artificial difficulties from the natural routes will also have the effect of developing the present small trade into a moderately large one. At present the Bhamo route is the favourite with the traders of British Burmah, who are nearly all Chinamen of Rangoon or the Straits Settlements. The Theinnee route is preferred by the merchants of Yunan, who trade chiefly with Mandalay. The former use the fortnightly steamers direct to and from Rangoon and Bhamo all the year round. The latter employ mules, which can only travel during the dry season. The greatest amount of trade is at present by the Bhamo route, and came up to about 200,000*l.* for exports and imports, between October 1873 and October 1874.

The Yunan Mission was to have started from Mandalay in December.

A Russian Caravan Journey to Másh-had.—Information has reached us of the progress of the caravan* organized by Colonel Glukhofsky in April last for a journey across Northern Persia to Kabul and back by way of Balkh and Khiva. The object of this experiment was to obtain all possible information respecting the trade, means of transport, and general condition of Eastern Persia, Afghanistan, and the minor states of the Upper Oxus. The *Journal de St. Petersburg* now states that although they expected to start in April, it proved so difficult to ascertain, either from books or from the Persian residents in Moscow, anything definite respecting the trade of the countries they proposed to traverse, that it was June before a departure was effected. The route was from Moscow to Nijni-Novgorod, thence down the Volga to Astrakhan, where the caravan arrived on the 28th of June, and left the 8th of July; thence to Baku where they took ship for Gaz or Gez, a poor village

* See *Geographical Magazine* for June 1874, p. 130.

with some ruined caravanserais on the south-east shore of the Caspian, and arrived at Astrabad. The transport of a *puđ* of merchandise from Moscow to this point costs $1\frac{1}{2}$ rouble, and as this raised the price of the sugar they had brought to 40 copecks more than what Tifis sugar fetched in the market, they were compelled to leave their stock behind. From Astrabad to Shâhrûd the caravan goods were conveyed on mule back along a route which is smooth at first, but soon becomes mountainous, stony, encumbered with fallen trees, and of considerable difficulty. The road is altogether about 40 versts in length, passes through one small village, and is surrounded with mountains covered with oaks and walnut-trees. There is a longer way from Astrabad to Shâhrûd, but it is haunted by roving Turkmen. Shâhrûd was reached on the 29th of July. This is, commercially and strategically, considered a town of some importance; there are caravanserais and bazaars, and plenty of scope for trade. But notwithstanding all the endeavours of M. Baumgarten, a Russian trader, who has for some years resided in the place, the caravan was unable to get rid of its goods in bulk, and after paying a toll of 2 roubles 80 copecks per *puđ*, it was allowed to go on to Sabzavar, which place was reached on the 20th of August. The vicinity of the town here offers excellent opportunity for the growth of mulberry and cotton. The manufacture of silk, however, is declining, and there are but three silk-weaving establishments, as compared with seventy last year! The price of French sugar, which had come from Tifis, proved that Russian sugar cannot at present compete with it in Sabzavar. Nearly all the trade is in the hands of a few Americans, who make a good thing out of it; there are a few Afghan merchants from Kandahar, but they do but little business. On the 23rd of August the caravan set out for Másh-had, followed by an Englishman, Captain Napier, who arrived at Shâhrûd while the Russians were in the town. The *Journal* intends to supply its readers with information respecting the further progress of the caravan.

Dar-Fur.—We are indebted to the German traveller, Nachtigall, for an account of the events which preceded the annexation of that country to Egypt. Several years ago, Zeber, a man of some education, left Khartum to seek his fortune in the unexplored countries lying between the Bahr-el-Ghazal and Dar-Fur. He gained much influence amongst the slave and ivory dealing Bakara, and succeeded in establishing a sort of sovereignty over the heathen districts of Telkauna, Kuturaka, Hofra-t-en-nehas, Shala, and Bina. Soon afterwards, another adventurer, Bulaláwi Mohammed, left Khartum for the same regions, and having persuaded the Egyptian authorities of being able to bring the countries between the Nile and lake Tsad under their sway, he was supplied by them with soldiers, arms, and money. But he soon quarrelled with Zeber, and about 1872 lost his life in a skirmish. The Egyptian Government, who had looked upon Bulaláwi Mohammed as their servant, condemned Zeber in contumaciam, but the latter, nothing abashed, reimbursed the Government the expenses incurred on behalf of his rival, and asked to be allowed to take his place. He made friends with the Rezekat Arabs, and was thus enabled to keep up regular communications with Kordofan. These

Arabs, however, at the instigation of Dar-Fur, it is said, plundered a caravan at Shegga, killing a number of the people accompanying it. Zeber punished the plunderers, and occupied Shegga, which is close to the frontier of Dar-Fur. He offered the newly-acquired territory to Egypt, was eventually appointed Colonel and Mudir, and soldiers were sent to him. Zeber assured the ruler of Dar-Fur that he was desirous of living at peace, but, in spite of this assurance, established a post at Kalaka, in the territory of the Habbania, the western neighbours of the Rezekat, and, undoubtedly, subjects of Dar-Fur. The Sultan of Dar-Fur sent an army against the invader, but met with a defeat. This was early in 1874. The Egyptian Government soon afterwards took measures for occupying Dar-Fur, and on the 17th of August, Dr. Nachtigall witnessed the departure from el-Obeid, in Kordofan, of 1500 men commanded by Ismail Pasha Ayub.* The country has since then been annexed to Egypt, and two expeditions, each consisting of eleven officers, a surgeon, twelve surveyors, and sixty-three men, left Cairo on December 5th for the purpose of its exploration. The first of these is commanded by Colonel Purdy, and will explore the country between the Wadi el Hamed and Dar-Fur; the second expedition, under Colonel Colston, will proceed to Dar-Fur by way of Debbe and el-Obeid. Subsequently both expeditions will proceed by different routes to the Sobat River, and finally they are to explore lake Albert Nyanza and the country to the west of it as far as the equator.

An Austrian Naturalist in Gordon's Nile Expedition.—Herr Ernst Marno has been selected on the recommendation of the Vienna Geographical Society, on behalf of the Austro-Hungarian nation, to accompany Colonel Gordon's Nile Expedition. It appears that the Colonel was anxious to give his expedition the character of an international, rather than a military undertaking, and having secured representatives of England, France, the United States, and Italy, he applied through the Austrian Consul at Khartum for a naturalist of that nationality to join his party, promising to defray all expenses beyond Berber. Herr Marno, who has been selected by the Vienna Geographical Society, is peculiarly fitted for the post. He speaks Arabic, knows the country round Khartum well, as well as the character of the natives, is thoroughly acclimatised by residence in these parts, and possesses high scientific qualifications. A sum of 6000 florins has been subscribed for his journey, and Marno will accordingly start for Suez, from whence he will travel down the Red Sea, land at Suakin, and thence make his way to Berber by the caravan route. From Berber he will be conveyed by steamer to Gondokoro, Gordon's head-quarters.

Australian and New Zealand Statistics.—The following statistics have been got together with great care, and are thoroughly reliable. They refer to the end of 1873. The whole population of Australia

* The battles referred to in the *Times* as having taken place at or near Kalaka, on the 17th of June and 2nd of July last, must have been fought by Zeber unaided, though it is strange Nachtigall, who was in the country at the time, should have heard nothing about them. Perhaps we ought to read September and October instead of June and July. Shegga, referred to above, is six or seven days' march to the S.S.W. of Omshanga, the easternmost town of Dar-Fur, and the latter lies seven days east of Fasher, the capital of the country. The population of Dar-Fur is estimated by Nachtigall at 5,000,000 souls.

is 1,825,692, the most populous colony being Victoria, which has 790,492 inhabitants, New South Wales 560,275, South Australia 198,257, Queensland 146,690, Tasmania 104,217, and Western Australia 25,761. The revenue of the Australian Colonies is 9,754,671*l.*, the rate of taxation being 2*l.* 8*s.* 2*d.* per head. The public debt of all the colonies together is 31,762,487*l.*; the value of imports 35,738,295*l.*, and of exports 36,407,428*l.* in 1873. The total annual value of the Australian trade is thus 72,145,723*l.* There are 1364 miles of railway open, 1505 in course of construction, and 18,448 miles of electric telegraph. The number of acres under cultivation is 3,085,214, of horses 737,511, of cattle 5,123,458, and of sheep 45,796,270.

The English population of New Zealand is 310,437; the revenue 1,420,216*l.*; the rate of taxation per head, 3*l.* 18*s.* 10*d.*; the public debt, 12,509,546*l.*; the value of imports, 7,241,062; of exports, 5,521,800*l.*; of the total trade, 12,662,862*l.*; the number of acres under cultivation, 1,226,222; of horses, 81,028; of cattle, 436,592; and of sheep, 9,700,629.

Obituary.—HENRY LISTER MAW.—We have to record the death of a veteran naval traveller. Born in 1801, Henry Maw entered the navy in 1818, and was severely wounded when a midshipman in H.M.S. 'Liffey' during the first Burmese war. The report of his services by Captain Marryat, the senior naval officer on the station, secured him his lieutenant's commission, which he received on July 25th, 1825. While serving on board H.M.S. 'Menai' in the Pacific, in 1827, he obtained permission from Captain Seymour to undertake a journey and voyage across the Andes and down the Amazon to Pará. He was thus the first Englishman to explore and describe the mighty river Amazon from near its source to its mouth, and his interesting *Journal of a Passage from the Pacific to the Atlantic* was published by Mr. Murray in 1829. Lieutenant Maw afterwards served in the West Indies, but did not go afloat subsequent to 1834. He became a retired commander in 1861, and died on the 7th of December 1874, aged 73.

DR. H. J. BURKART died on the 6th of November at Bonn, aged 76. In 1825 the deceased entered the service of the Tlupujahua Mining Company, in Mexico. Three years afterwards he undertook the management of the Bolanos Mines, and during his term of administration the company realized a clear profit of 928,850*l.* In 1834 Burkart returned to Germany, where he wrote an account of his travels and published a geological map of Mexico.

DR. JOHANN HEINRICH PLATH, a well-known Chinese scholar, died on the 16th of November last, at Munich, aged 73. He was the author of a *History of the Manjus*, as well as of numerous papers on Oriental subjects, and has left the concluding part of a work on Confucius ready to go to press. To geographers he is best known as the writer of the geography of China in Wappaeus' edition of Stein and Hoerschelmann's *Handbook of Geography*.

ERRATA.

In our last number, p. 389, 2nd col., line 39, *for εις την πολιν read εις την πολιν*; and line 42 *for W. Mark's, read St. Mark's*.

Correspondence.

THE IDENTIFICATION OF THE TAGIGUINIA OF CLAVIJO.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I take the liberty of addressing to you some observations with reference to the letter of Colonel Yule, published in your last number at pp. 389-390. Your learned compatriot is perfectly right in attributing to a *lapsus calami* my having placed Saghanian on the left bank of the Oxus. Istakri places that fortress, and its district, at four days' journey from Termed, and Hukan-kuba at five days (see *Bib. Geographorum Arabicorum ed De Goge.*, i., p. 339, and ii., p. 401). Nevertheless, I believe I am right in seeing in Saghanian the exact translation of the *Tagiguinia* of Clavijo. That name is twice mentioned by the Spanish traveller, at page 1, as the name of the first or one of the first countries conquered by Timour, and at p. 115, where he says, speaking of the town of Anchoy, "this city was beyond the land of Media, in a land called *Tagiguinia*." Now, as the successes obtained by Timour in Saghanian, between Termed and Badakshan, refer to the commencement of his career (see *Inst. of Timour, by Major Daly*, p. 55, *et seq.*), I believe that the *Tagiguinia* of the first page of Clavijo ought to be identified with Saghanian. If this be so, the very serious difficulty, pointed out by the learned editor of *Marco Polo*, only refers to the second *Tagiguinia*, mentioned at p. 115 of your translation. But it seems to me that Colonel Yule himself disposes of that difficulty in a way which leaves nothing to desire, by recognizing that name in that of *Fazgana*. For we know from Yakout (*Dict. Geog. de la Perse pour Barbier de Meynard*, p. 177) that the Arabian geographers designated by *Djouzdjan* and *Djouzdjanan*, a vast district of the province of Balkh, situated between that city and Merw-er-rand, and which embraced the territories of Ildirab, Meimanah, Shebirghan, and, evidently, also Andkhoud or Achay.

As to the hesitation of Colonel Yule to affirm that the name of Saghanian was still in use in the days of Timour, I believe that it ought not to continue after the two quotations from the memoirs of Baber, which he himself refers to. And if at pp. 60 and 61, he tells me that he reads of the fortress *Shaghanian*, we read at p. 84 of the English translation (p. 99 of the *Djaghatai text ed. Kazan*), "On halting at the valley of the *district of Shaghanian*." The name of this district is mentioned later by the Turkish traveller, Sidi 'Aly, who visited Transoxiana in 1555 (968 A.H.), and who wrote it *Tchaghanian* (see *Relat. du Voyage de Sidi 'Aly, trad. pour M. Moris, Paris, 1827*, p. 97). I believe that the first *Tagiguinia* of Clavijo must be the Saghanian of Oriental geographers, while the second is, as Colonel Yule supposes, the *Djouzdjan* of the Arabs.—Yours, &c.
N. DE KHANIKOF.

LIEUTENANT CAMERON'S DISCOVERY.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I do not know whether you will think worthy of admission the following remarks on Mr. Waller's criticism; remarks that it would have been a presumption for me, not an African traveller, to have made at the meeting of the Royal Geographical Society on Monday, the 14th of December.

Rivers issuing from lakes do not, I believe, as a rule—certainly they do not always—issue with a strong current; even though these rivers may have lower down a very strong current, with rapids or falls. The Niagara River "glides along at first with a clear, smooth, and tranquil current" writes Sir C. Lyell (*Principles of Geology*). The St. Lawrence too issues calmly from lake Ontario. To come nearer home, I have seen the small river Kirkaig, on the West Coast of Sutherlandshire, when

"in spate" issuing from lake Kirkaig with a trivial current, though a mile below it has a fall of 30 or 40 feet, and is a torrent nearly all the way to the sea. Its neighbour the Inver is another example; so is the Shin; but the last I have not seen "in spate." Does the Jordan issue furiously from lake Tiberias? I cannot in any work at hand find information as to this.

As to the (supposed) outlet of lake Tanganyika being choked with grass, &c. One might expect that when the streams running into the lake would bring most grass down, and when the outlet would cause a set towards itself from the greatest distance, then the outlet would draw in most grass, and might get choked up. This may seem mere theory; but it is a fact that in the Amazons Valley channels often get thus choked up in flood-time, and canoes have then to find a way through the flooded woodland: afterwards, paradoxical though it appear, the channels clear themselves.

As to the 55 days journey down the Congo. If the journey were made by water this seems quite enough, as 10 miles a day down stream is a moderate estimate.

In conclusion, I will only add a hope that Lieutenant Cameron may be backed up in his spirited and persevering efforts.—I am, &c., F. R. G. S.

—:o:—

BALA SAGUN AND KARAKORUM.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—With reference to my previous letter, I beg to add the following notes:—

Khieou, surnamed Tchang-Tch'un, in his journey to the camp of Tchingiz-Khan in 1221, gives very definite information as to the situation of the country of which the capital was Bala Sagun. An account of this journey, which was preserved in the Daos books, was translated from the Chinese into Russian by Father Palladii, and was published in the *Labours of the Russian Spiritual Mission in Peking*, 1866, vol. iv., page 261. A French translation, by M. Pauthier, appeared in 1867, in the *Journal Asiatique*, 6^{ème} série, t. ix., p. 39. Apparently the two travellers have used different texts, for the Russian translation is three times as long as the French, and contains many exceedingly interesting details which the other omits, especially the odes composed on his journey, at different times, by Tchang-Tch'un. At the same time many passages which are evidently alike are differently rendered.

The general route of the traveller is most easy to trace, and even the details are readily verified by one who is acquainted with the country. From lake Sairam-Nor Tchang-Tch'un passed through the defile of Talki, and arrived at the city of Alima, in the present province of Kuldja. The city was named, as he says, from the Turki *Alma*, an apple, and its position can even now be traced. Going from here westward for four days he reached a large river flowing from west to east, which he crossed in boats on the 19th of October 1221. This river can only be the Ili, which, from the Russian version, it is evident that the traveller had not before seen, and not the Tchu, as Lerch supposes, or the Talas, as is thought by Palladii. In the Russian translation the name of the river is given as the Talasu-Mulian; in the French translation it is called the Ta-tsze-sze (Teh-ke-sze), which apparently points to the river Tekes, a large affluent of the Ili flowing into it a little above Kuldja, and which may at that time have given the name to the river. After crossing the river and going southward he came to a range of high mountains, the present Ala-tau, at the foot of which was a small fortified town. Going from here westward for twelve days, he crossed a mountain to the south-west, probably at the Kastek Pass. Proceeding from here southward he came to a river, the Tchu, which he crossed on a wooden bridge (probably near Tokmak), and from here went westward along the foot of the mountains until they suddenly fell away to the south, and were mere ruins of red stone, identified by Lerch as the present Akhyr-tepé near Anlié-ata, and

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thence to the town of Sairam. This country, comprising the valley of the Tchu and the rivers that fall into it, Tchang-Tch'un says, was the possession of Tashih-Linya, (Yeliu-Tashi) a prince of Liao, whose capital we know was Bala Sagun. Tchang-Tch'un relates the history of the country, the reception and treachery of the Norman prince, and its subsequent conquest by the Sultan of Kharezm and by Tchingiz Khan in the same way as the Mussulman authorities.

Had the city of Bala Sagun been on his route, he would in all probability have mentioned it, and we must therefore suppose that it was somewhat farther to the north of the valley of the Tchu. Many ruins exist here, but they have not yet been investigated.—I am &c.

ST. PETERSBURG, November 20th.

E. SCHUYLER.

—:o:—

ETYMOLOGY OF AOSTA.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In the *Saturday Review* of the 14th November, the writer of an interesting article upon Aosta, whose picturesque descriptions and trenchant style at once disclose his identity, calls attention to the fact that the name Aosta is but a modified form of Augusta. Besides the parallel instances which he quotes of Augsburg, Autun, and Zaragoza, I would venture to call his attention to two other cities which bore the same Roman name, on this side the Alps from Augusta Prætoriana: one, Augustum, now the little village of Aoste in the department of the Isère, close to the Rhone at its great southern bend, a station on the Transalpine Roman road as one ascended from Vienne; the other Augusta Tricastinorum, now Aouste, on the banks of the Drône, between Die and Valence. So too Augusta Rannacorum survives in Augst—Kaiser's Augst it has sometimes been called—in Canton Aargau a few miles east from Basel. In Italy, Augusta Taurinorum has adopted the tribal name and become Turin. Augusta Vagiennorum has disappeared both in name and in reality, but a small Augusta to the north of Ravenna, near the southern mouth of the Po, still preserves its name and insignificant existence in Agosta. The Agosta or Augusta in Sicily owns as its founder a mediæval emperor, the Suabian Frederic.—Yours obediently,

OXFORD, November 1874.

T. R. BUCHANAN.

—:o:—

PARHELIA IN ENGLAND.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—The sight of a mock-sun in England is perhaps about as rare an occurrence as the sight of a whale, although both are no doubt familiar enough to voyagers in the Arctic Regions. On Tuesday, December 15th, about ten minutes to twelve o'clock, there appeared in the southern sky about 28° east of the true sun, and on the same altitude, a splendid example of the northern parhelion.

Like most parhelia of this kind it was connected with a prismatic bow, small portions of which only were clearly visible above and below the mock-disk, streaming up and down like coloured aurora, or part of a rainbow, as patches of cloud behind became dense enough to form a background for its display.

From the time I first observed this phenomenon till its final disappearance was about twenty minutes, during which time the actual sun was surrounded by a dense white fuzzy halo, and I felt certain that this was the harbinger of snow, although there was nothing else at the time to indicate its immediate presence. At seven o'clock the same evening the snow came, and by seven next morning had fallen here to the depth of 9 inches.

Now, sir, I need scarcely say that all sorts of weather phenomena, however unusual it may be in our temperate climate, would neither be difficult to predict, nor come upon us unexpectedly were we acquainted in time with the movements of those agents which generate and control their production.—Yours &c.,

ELMSTREAD, MALVERN, December 1874.

G. P. YEATS.

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Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

December 14th, 1874.

THE President, Sir HENRY RAWLINSON, took the chair at 8.30 P.M. Among those present were Lord Arthur Russell, Lord Houghton, General Rigby, Sir Rutherford Alcock, Sir Cecil Beadon, Viscount Duprat, Mr. Monteiro, Mr. H. L. Cameron, and Mr. Waller.

In opening the proceedings the President said the business of the evening related to two expeditions which were sent out two years ago for the relief of the lamented Livingstone. The immediate subject of the meeting was the journal of Lieutenant Grandy on the West Coast of Africa in his attempt to ascend the Congo in search of Livingstone. But before entering upon that subject he took the opportunity of informing the Fellows of the success which had been achieved on the other side by Lieutenant Cameron. A full account of this important discovery will be found in the leading article of our present number, to which we beg to call special attention.

Sir Henry then briefly introduced to the notice of the Fellows the facts of Lieutenant Grandy's mission, who, it will be remembered, was sent by the munificence of Mr. Young, of Kelly, to try and meet Livingstone on the Congo by penetrating from the West Coast; and, after a plucky attempt to carry out his mission, was baffled by the opposition of the native chiefs, and was waiting on the Congo River for the recurrence of the proper season for a renewed attempt, when the news of Livingstone's death was conveyed to him up the river, with a letter of recall from the Royal Geographical Society.

Mr. CLEMENTS MARKHAM then read Lieutenant Grandy's report on

LIVINGSTONE CONGO EXPEDITION.

THE Expedition left Liverpool on the 3rd of November 1872, and, calling at Sierra Leone to procure men, proceeded to St. Paul de Loanda, where the outfit was purchased, and finding on enquiry that Ambriz would be the best place to obtain carriers for the interior, we started for that port on the 15th of February 1873, and after considerable difficulty in procuring the requisite number, left on the 12th of March.

The journey from Ambriz to Bembe occupied eleven days, and we reached the citadel of Bembe on the 23rd, after a breather up the hill, which is very steep, and were very kindly received by the chief, who housed the men very comfortably in a portion of the barracks, and gave us a lock-up store for our cargoes. The last carriers arrived at 3 o'clock, and shortly afterwards the rain came down in torrents, with much thunder and lightning, which lasted till midnight. This is the season for heavy rains. The finest months at Bembe are May, June, July, and part of August, when the weather is nice and cool. The latter part of August and the month of September are also considered fine. In October and November there is plenty of rain. In December, January, and February light rains. March and April are the big rains. Bembe is the most advanced port of the Portuguese, and at the same time a very important one, as commanding the roads to and from the interior. The fort is in a very bad state of repair, and there was a strong rumour that the Portuguese intended abandoning it. There are four markets held on consecutive days near Bembe: the first is called Candoo, the second Conzo, third Kangué, and the fourth Sonha.

March 25th.—Paid a visit to the copper-mines. There seems still to be a considerable amount of ore there. Formerly they had an English manager here,

and every requisite in machinery, but the manager died, and the Company got into difficulties, and the whole plant was eventually destroyed by fire. There is a chief at Encoge, three days south of this place, through whom communication is kept up with Loanda. The place produces large quantities of good quality coffee, and fine sheep may also be obtained; but the climate, from the greater quantity of rain that falls, is much more unhealthy.

At Tombo, which lies about seven days' journey from this, good cattle are obtained for cloth: it produces also coffee, india-rubber, tobacco, palm-oil, &c., and is considered a large place. Sierra Bembe, which is a remarkable mountain, and round the base of which passes the Luguria River, is 1605 yards from the fort. I took a boiling-point on its summit, which gave a mean reading at 208°.1—barometer 28° 16'; thermometer at commencement, 78°; at finish 82°.

Thursday, April 3rd.—Having vainly endeavoured to procure carriers from the different villages round Bembe, who one and all refused to go, even when the chief exerted his authority to assist me, saying there was too much water, and too much long grass on the road, we determined to send to the king of Congo for men, and accordingly despatched the interpreter, one soldier, and a *capata*, with letters from the chief and ourselves, and a good present.

Wednesday 9th.—Paid a visit to the caves, which are in the same valley as the mines, but a mile further to the south-eastward: they are very interesting, and the rocks from which they have been scooped form a strange feature amongst the surrounding soil of slate and shale, being composed entirely of limestone. The entrance to the first cave is by a low, narrow passage, and having arrived at the end, you enter a circular vaulted chamber about 35 feet in diameter and 40 feet high. Beyond this again is another chamber, nearly 60 feet in height, and also circular. In these caves, it is said, the natives deposited the copper ore they collected at the mines before the Portuguese took possession. Passing round to the right, after emerging from the two first chambers, you enter a second cave of greater extent, but not so singular in shape, the roof gradually sloping to the ground. We found some few specimens of malachite in the caves.

Sunday 20th.—At 4 o'clock, our party returned from Congo, bringing with them sixty-six carriers. They were six days coming back, and report the roads very bad; they brought several letters from the chief, and one for us, expressing a wish that we would come speedily, and enumerating a list of articles I was to bring as presents.

Thursday 24th.—Started the sixty-six carriers with an escort of seven men. We were both down with fever so badly to-day that had not the chief kindly assisted us in arranging matters, we could not have got them away to-day. They have promised to send us more men back from the towns as they proceed.

Wednesday 30th.—Having succeeded in collecting thirty more carriers, started my brother, with six men as escort, for Congo on the morning of May the 1st, and accompanied them as far as the river Loozi, and superintended the crossing. This river is generally insignificant, but, owing to the heavy rains, had overflowed its banks, and was nearly 90 yards across. There was considerable difficulty in getting the cargoes across, the natives being afraid as the river in the centre was chin deep, and but for our men they must have encamped for the night.

Sunday, May 4th.—There was a conference held to-day with the Soba of Matatu about taking charge and care of the fortress of Bembe when evacuated by the Portuguese, and it was partly agreed that on consideration of his doing so he was to receive 200,000 beads per month and the Soba of Bonde 60,000 beads. I cannot help thinking it a great mistake to give up possession of a place which is the key to the interior, and a day will yet come when they will repent having relinquished

a position that cost Portugal so many lives and so much money to obtain. The moment the troops leave the roads to the coast will be stopped, and Ambriz will suffer a great loss of trade.

Wednesday 7th.—The requisite number of carriers arrived to-day, and I had fever unfortunately too bad to allow of moving, so did not make a start until 9 o'clock on the morning of the 8th. I was exceedingly sorry at parting with the chief, who, in his kindness and attention to our men and selves, has been almost as a brother. He pressed on me from his small store some rice, wine, bread, &c., and accompanied me to the first village, where he embraced me and wished me Godspeed and good fortune. Our men, I am glad to state, fell in of their own free will, and one of them acting as spokesman for the rest, thanked the chief for his great kindness to them. The chief seemed much moved at their gratitude, and said he had never known black men thankful before.

Two hours' march north brought us to the Loozi River which fortunately had resumed its normal condition, being only 9 feet across and 4 deep, the stream going to the westward. Crossing the river we passed up through the village and proceeded in a northerly direction for Miembe, where we slept the night. Starting at seven the following morning, twenty minutes' walk brought us to the cross roads, one of which leads to Zombo. Here, stuck on poles, were the heads of two men, who had a few days previously suffered torture and death for theft. Their calcined bones were in the grass, and their clothes hung on the bushes. The heads, on which the wool and flesh still remained, presented a very ghastly spectacle. The day's march was principally through long grass, with some climbing. The road being tolerably good, we descended to the Lafozi River, and crossed it by a bridge that had just been completed above the rapids. I paid a toll of 12,000 beads for the crossing of the whole party. We were detained here an hour and a half getting the donkeys across and repairing their loads. The men enjoyed a good bath here and astonished the natives with diving and swimming. At 1 o'clock, we arrived at the village of Loofoosa, where, as the capatas and carriers belonged to the village, we halted for the night.

The chief paid me a visit after dinner, and I explained to him the object of our journey; how Dr. Livingstone had been labouring for more than thirty years, giving up home, country, and friends, and devoting his life to their benefit, and eradicating the curse of their country—slavery. I explained to him the manufacture and use of india-rubber and candles; and that his country supplied the materials, by the cultivation of which, and sale to the white man, his country would greatly prosper. He seemed perfectly to understand and appreciate the necessity, but replied, that unfortunately he was very old, and that his people were too indolent to cultivate more ground than their wants required.

Saturday 10th.—We were away this morning by 7, being anxious to cross the Breeze River, the passage of which, owing to its swollen state and strong current, with the unpleasant addition of a tornado, occupied five hours, and but for the courage and skill exhibited by our men, one canoe would have been lost. By 9 P.M., everything, including the donkeys, had crossed, and breasting a very steep hill, we were glad to reach the little village of Kingo.

Thursday 15th.—We ascended a hill and saw the Congo plateau 6 miles ahead. The ground here was cultivated, corn, sugar-cane, beans, &c., growing plentifully. Anxious to complete our journey, we pushed on, and passing through the village of Kimalo down to the valley, arrived at and crossed the Luaji River, which had considerably overflowed its banks, and rendered the passage of it difficult. One hour's march brought us to the village of Ovoonda, where we were met by a number of King Totala's people, and, in company with them, after half-an-hour's journey, reached Congo,

and had an audience, delivered to the king some letters, &c., and then begged him to excuse us a short time, while we changed our wet clothes. Returning, we were received with great state, the old king sitting on a chair, under a huge state umbrella, habited in the uniform of a Portuguese lieutenant and surrounded by his sons and principal chiefs. Chairs were placed for our accommodation and rugs and carpets spread in profusion; salutations were exchanged amid a flourish of trumpets, tom-toms, &c. He expressed his great joy at being visited by Englishmen, requested to be allowed to salute us with 100 guns, and hoped that we should remain a long time with him and consider his town as our home in that part of the world, and that many more would follow us, for he was very fond of the white man. After an introduction and general shaking of hands with all the principal chiefs, we were allowed, as it was getting dark, to retire and attend to ourselves, promising to come early in the morning with the presents.

Friday 16th.—While busy selecting cloths for the king, he sent to ask me to shoot a bullock for ourselves and men, and refused to accept more than a hind quarter for himself. About noon we marched the men to his place with the presents, with which he was very much pleased, saying no white man had ever so honoured him. We considered it necessary to give as much as possibly could be afforded, in order to make a good friend of him, he being the most important person in the country, whose influence would materially affect our future prospects. In the afternoon he paid us a visit, and we broached the subject of the carriers, and difficulties immediately presented themselves—bad state of the roads, quantity of water, danger of being fired upon, price, &c. We managed to dispose of his objections one by one, and it was eventually settled that two of his sons were to busy themselves in obtaining carriers, and he would send a messenger to the king ahead to clear the road for us.

Congo, or the San Salvador of the Portuguese, is situated on an elevated plateau 1500 feet above the sea level. It has formerly been an extensive fortified city, surrounded by a loopholed wall, averaging 15 feet in height and 3 feet in thickness, portions of which are still standing. There are also the ruins of a large church or cathedral at the north-west portion of the town. The Portuguese held military occupation for some years, but abandoned it in 1870, and their forts and barracks are now ruins, completely overgrown with rank grass and shrubs. The town is supplied with water from a beautiful spring, which issues in three small streams from the clay soil half way down the plateau on the east side of the town. There are very few trees near the town; bananas, plantains, and fowls are plentiful and cheap, and the farms of beans, cassava, and ground-nuts are well kept. There are three markets weekly held near the town. The Congoese are great snuff-takers, are well clothed, and a great many speak Portuguese. They are dark coloured and of average height, but not muscular; indifferently armed with flint muskets and knives, and very fond of hunting. They make free use of the knife in their quarrels, not using it as a dagger, but giving long sweeping cuts across the back, breast, and stomach. They are habitually lazy. The women are decently clothed, modest and virtuous, and exceedingly industrious. They tend the farms, look after the house, and cook the meals, whilst the man sits quietly down and smokes his pipe. Polygamy is general in the country, and a man is accounted rich according to the number of his wives, who, as soon as married, select a piece of ground which they industriously farm, the produce being sold at the markets for beads, cloth, &c. The king of Congo has two nephews, and, by the laws of the country, one of them, who shall be the choice of the people, succeeds to the throne. Failing a nephew, the people elect a king themselves. The sons of the king do not in any way participate, nor are they entitled to any of his property; but during his lifetime he can appoint them to chiefships of towns in his kingdom as vacancies occur.

The king of Congo commands the roads from the interior to the coast, and levies contributions on all "chiboukas" of ivory. He was once a very powerful chief, and, being supported by the Portuguese, was much respected; but since they withdrew from Congo he has been gradually sinking to the level of other chiefs, and, although he keeps up an outward show of authority, he has very little power.

May 18th.—Had a consultation this morning with the old hunters and the king's son about the different roads, and am convinced that the one to Sundi is the shortest and best. They call it nine days' journey without loads, or twelve days' with loads, and say the travelling is good, and that silver and copper are found there.

Friday, June 20th.—After innumerable delays and vexations enough to try the spirit of any Job, we have at length succeeded in collecting and paying the carriers, and managed at 5 P.M. to get away from Congo, and after an easy march in a northerly direction, arrived at the small village of Kikembo. I began to fear we never should get out of Congo; the disaffected people were constantly bringing in reports that chiefs, whose towns we were to pass had sent word that they intended to fire upon and exterminate the whole party, and, therefore, carriers had better not come with us. These and like stories, which it would be tedious to repeat, lost us a whole month of the best season of the year. We insisted upon the king punishing one man whom we had caught setting his countrymen against us, and preventing the carriers from offering their services. We went, before leaving, to wish the king good-bye, and make him a parting present. He was very thankful, and begged us to think that he was our great friend, that his heart was right towards us, &c.; that he had done his best to get us forward; but his people kept the carriers back by circulating lies about the dangers of the road; that we would eat them when we got them far away, and never allow any of them to return to their country.

Saturday, June 21st.—Did not get away till late owing to some of the carriers having returned to Congo for the night. Half an hour brought us to a gorge, through which we passed, and down the high level of a valley, hills nearest on the right hand with outcrop of granite. We can plainly see that this would have been a very bad road three weeks earlier—the valley would have been a swamp. The grass is similar to that we met with from Bembe to Congo, where you pull your hat well down over your eyes to take a header, emerging only when you arrive at your destination; nothing to be seen above the wall of grass but the heavens, and often not even that. The sun was very hot to-day, and after an hour's slow travelling, the carriers came to a halt at the head of the valley. They are a miserable lot, stopping every five or six minutes. After many delays we reached the village of Kintano, where we halted for the night; had a visit and present from the chief, and took the opportunity to explain all about ourselves and our mission, and managed to do away with the bad impression existing in their minds about us. We were well pleased, for this was one of the towns named where we should meet with opposition; and instead we have been well received, the carriers have taken heart, and now talk very courageously.

Sunday, June 22nd.—Started at 6.30, and an hour's journey brought us to the Loanza Swamp, which occupied an hour in crossing, owing to the difficulties of getting the donkeys through the slush and mud. Passing up to and through Banza Loanza, in five minutes we reached another swamp, crossing which we arrived at the village, where we found the chief, who, by especial desire of the carriers, had been sent ahead with presents to clear the road, and was to have met us at Makoota. Continuing in a north-easterly direction for Kilémbela (the road good, with less grass, but a good deal of climbing), we reached that place in a couple of hours. I received a very extraordinary message from

the king of this town, asking me to order my men to wear their trowsers, as he did not consider the handkerchiefs, which the men usually wore on the march, sufficient clothing. I could not help smiling at this excess of modesty, but, nevertheless, satisfied his whim. We were kept waiting an hour before being admitted to an audience, during which time it was evident, by the king's appearance and manner, his people had been priming him with palm wine. He was a fine, tall, muscular-looking man, but, being very drunk, was quite the savage, dancing and capering round us like a big baboon, and flourishing a rusty old sword, and declaring that no man was to move out of his town under penalty of death. Foreseeing the effect this was likely to have on the carriers, we endeavoured to arrange a large present for him and proceed; but the threat had already taken effect, and the carriers were already bolting from the town, and by 8 P.M. not one was to be found. Here was a dilemma! These men had been paid to take us to Makoota. King Totala had made them a long speech before leaving Congo, urging them to fulfil their contract, and sending his own secretary, and two principal chiefs on purpose to give them confidence, and yet a few words from a half-drunken man had frightened them away. One chief who volunteered to accompany us from Kikembo alone remained faithful, but he was forcibly dragged away by his own people. Of course we were very angry at such conduct on the part of the king, and the following morning early, when we thought he was sure to be sober, we sent for him, and said how shamefully he had behaved. But expostulation was useless; he declared it was all a mistake, that he had been told the carriers were to leave us here—this being the limit of the King of Congo's territory—and that his people were quite capable of taking us to Makoota. Finding we were trapped, the best plan was to put a good face on matters, and tell him that as we were anxious to proceed, if he would collect the carriers without delay we would give him a handsome present.

Kilémbela is a considerable town on the borders of Congo (this new kingdom extends as far as the Quilo River, where you come upon the Makoota territory); it is situated on the top of a hill, with water round. There are large groves of palms here, and ground-nut farms, but no corn, plantains, or bananas, which is rather remarkable. There are two good markets near, which are well supplied. There are two varieties of bean, the ground (creeping) and tree-bean; the latter is sometimes left for two years before cut down. This place could produce a large quantity of palm-oil annually. We explained this matter to the king, and gave him a candle, telling him that was made from the stearine, and that, if he chose to manufacture the oil and send it to the English factories, he would obtain a good price. He replied that he had no idea they would purchase it, but that he would now give his attention to it, and send forty loads to Boma as a trial; he is also going to try and grow corn and bananas.

One hour's slow travelling in a northerly direction is the village of Keweve, the approach to which is through the finest bit of wood we have seen—the trees large, lofty, and abundant, affording a grateful shade. The village rests on a hill, is large, well built, and clean; in fact, the place had quite an air of civilization about it. A further journey of an hour and a half, and we were at Mokumbo, where reside the family of the King of Kilémbela. This village was also well kept, and there were plenty of fine sheep, also goats, pigeons, and fowls. Passing through the village and emerging through the trees, we saw to our right the mountain range of Lombo, with a plain some 12 miles in extent intervening. The day was very warm, and the carriers were a good deal done up when we reached the village of Onza, which, although belonging to our king, refused at first to allow us to remain (some malicious natives having spread reports calculated to deter us), but after a long palaver, and taking into consideration that the sun had gone down,

they allowed us to halt. They cultivate large quantities of corn (maize) around this town, and we noticed large fields of it near the villages we passed to-day.

July 6th.—We reached the town of Moila, the chief of which is a son of our king. The men and women took to the bush on our arrival, and it was some time before they could be coaxed back. The following morning the chief paid us a visit, and made a present of a sheep. We remained the day, as there was a market held ahead, and the chiefs were afraid the drunken men would be firing on the carriers. They held a grand "batook" in the town, which lasted till past midnight. These country people are very fond of dancing, at least the male portion, and think nothing of keeping it up all night, when the moon will give them light enough.

Leaving Moila on the 8th of July, we arrived at the village of Mokanda. On the 15th of July we again made a start, and in half an hour reached the Quilo River, which we crossed by a native suspension bridge, exceedingly strong, and well constructed of monkey rope. It would bear ten carriers with loads, but oscillated so that many of them preferred crawling to walking; the river was very low, being the dry season. It is said to be swarming with alligators, and we were afraid we should lose some of the donkeys in swimming them across, but fortunately got them over safe, about half a mile below the bridge, where there was less water, having paid four pieces of cloth to the chief of Banyanga, who collects the bridge tolls. We passed on through his village, and crossing the Luanga River, reached the town of Lâquã, where we remained for the night. After crossing the Quilo River the aspect of the country changes: there are remarkable and abundant outcroppings of limestone rock, some rising abruptly from the grassy plain to an altitude of 100 feet, and from their weather-beaten appearance resembling rocks in the sea. The soil has also changed from brown to blue clay, of which the native pots and pipes are manufactured at Makoota. The following day we passed through a large grassy plain (a swamp in the rainy season), and reached the small village of Muncola, where the carriers came to a halt and positively refused to proceed any farther; and when we sent for the king, he said it would first be necessary to send a messenger ahead with a present and await his return. To guard against excuse for the carriers bolting this was done; but then no guide could be found under any promise of payment to take the messengers to Tungwa. Fortunately, we had one man who knew the road, and he with three others was sent. They returned at 8 P.M., having delivered the present to the chief, who said it was all right, but that as our present to the King of Makoota had miscarried, and he was the principal, we must send him another, which was accordingly done, the men starting early on the following morning. Shortly afterwards there was a free fight with knives and sticks among the carriers, and then word was sent us that they must have three furs more each before they would move the cargoes. An offer was made them of four pieces of cloth, which some were inclined to accept, as it was only two and a half hours' further journey to Tungwa; but in the middle of the negotiations a messenger arrived, stating that our king and all his followers were bolting out of the village as fast as their legs could carry them, and, of course, the remainder of the carriers immediately followed suit. We sent, and the chief of the town also, to stop the king, but to no purpose. At the time we were at a loss to account for this sudden stampede, but heard afterwards that word had been sent to the King of Kiléinbela, that if he attempted to go to the chief town with us, his head would be struck off. Being anxious to reach Tungwa as speedily as possible, I started with one man, and after a smart walk of 24 hours arrived at the market-place, where I was requested to wait until my arrival was announced to the chief. Shortly there arrived a headman with about forty of the

townspeople. He told me they were busy with the burial of the chief's son (which accounted for the firing of guns and tom-tomming that was going on), that in the name of the chief he was very glad to see me, but could not understand what a white man was doing such a long distance from the big water. I explained our mission and requested him to ask the chief to supply us with carriers and bring us on to his town, without delay; and asked to be allowed to enter the town and visit the chief. He returned, promising speedily to send an answer. I was kept waiting till after sunset, when our own messengers returned, bringing back with them all the presents that had been sent, with a message to the effect that we must not pass by that road, as their father had forbidden it, and that they would not supply us with any carriers. As nothing more could be done that night we returned to the village of Muncola, and the next morning went again to the market, accompanied by the chief of the village and three or four men, bearing presents, and invited the chief of Tungwa to a council to state his reasons for refusing the road, after receiving our first messenger from Congo, accepting the presents, and inviting us to come. The palaver lasted nearly the whole day, and ended most unsatisfactorily: they would not accept our presents or give us carriers on the road. Their father had forbidden it, therefore the matter was out of their hands. Finding no amount of coaxing or presents would have any effect upon them, we concluded it better to return to Muncola and arrange carriers to take us to Kinsuka, and skirting the territory of Makoota, reach Sundi or some other part of the river. We were the more inclined to adopt this plan, as the season was already well advanced, and time was of the utmost consequence to us if we intended to be of any assistance to Dr. Livingstone. Had we not been encumbered with baggage we might easily have pushed past these people and gained the river, but our duty was plainly to reach the Doctor, with sufficient goods for his party and our own.

Tungwa is by far the most populous and best built town we have seen, the streets are regularly laid out and cleanly, the people are ivory traders, and the whole place has an appearance of prosperity. Our interpreter said the chief had in his house chairs, tables, and every article of European manufacture that is traded with, and lives in comparative luxury. He looked upon our presents as being very insignificant. The estimated population is about 1600. The river, which rises from a fountain about 8 miles eastward of the town, flows round three sides of it, the fourth having a background of hills, the slopes of which are cultivated. Since crossing the Quilo River, we have noticed the natives are smaller in stature and of a lighter colour, this being especially remarkable with the Tungwa people. Banza Macoota, the residence of the king, is a large manufacturing town lying in the valley to the northward of Tungwa; it is noted for pottery pipes, mats, and grass cloths. The surrounding country is very fertile and well cultivated, producing sugar-cane, corn, ground-nuts, mandioca, yams, beans, &c., poultry, sheep and goats, are also plentiful. The river Tungwa flows past the western end of the town. The chief of Muncola gave us a great deal of trouble; would not allow his people to sell us any provisions, and was constantly sending us threatening messages, and delayed procuring us carriers until he found we were determined not to leave until he found the men. After four delays we succeeded in obtaining the requisite number, and began in the morning retracing our steps, reaching Lâquã in a few hours, where the carriers all bolted from us again; but as the chief immediately offered to supply their places, it was easy to see what arrangement had been arrived at. Unfortunately it is the custom of the country to make all payments before starting. We often, foreseeing the inconvenience of it, and how completely we were at the mercy of the chiefs and carriers, tried to break through the custom, but to no purpose; they would not touch a cargo until all had

been paid for. The usual trouble here; and as the distance to Banza-Umputa was only a little over 4 miles, we determined to move the cargoes with our own men, seeing which the natives rushed in a body, and cut the bridge over the river. This was rather too much of a joke, so I marched, revolver in hand, to the chief's house, and taking possession of him, gave him to understand that unless it was repaired in twenty minutes I would shoot him and burn his town. He disclaimed all knowledge of the affair, had the bridge hastily repaired, the carriers accepted the cloth they had already refused, picked up the cargoes with alacrity, and hastened on; but the moment they had crossed the Quilo River by the bridge, they dropped their burdens and ran for it, and we were some hours collecting it all at the Banza.

The following morning we started four men, accompanied by two appointed by the chief of this town, to Kinsuka with presents, and a demand for carriers. They returned next day, having reached as far as Zonzo (the next large town to Kinsuka) the chief of which refused our presents, saying the king of Makoota had sent him word that we had been refused the road, and asking him not to allow us to pass by his road. He said he was sure there was something wrong about us or the king would not have run away at Muncola; that he did not trade nor his people; and he was perfectly satisfied to wear country cloth and use native mats. He did not want us nor our presents in his country, and we had better go back to Congo and try some other road. Thus was our second chance lost; but knowing the influence of the king of Congo, and mindful of his promise to come in person and assist in clearing the road, I sent immediately to request him to come and bring with him the required number of carriers, as these people would not furnish us with any, except on condition that we went back, and we were naturally anxious to retain a position which had cost so much time and cloth. While the messengers were on the road to Congo, acting upon information, we despatched men to Tungwa with additional presents, and after five days delay (during which time all manner of conflicting reports were received), they returned. A meeting of chiefs took place, and they discussed our request for the road. The king of Makoota did not attend, but both he and the father of the chief of Tungwa refused to allow us to advance. The young chief, who commands the eastern portion of the town, sent me word that if we would return to Congo, and procure 200 soldiers, he would "pat his stomach" (equal to an oath and more binding) to me, and carry me with his own men to any place on the river I chose to name. He said he would first kill his father and burn his town—nice youth!—and then dare the king of Makoota to interfere with him. Out of all the presents sent by the son of the king of Congo—Lema—he only received 8 fathoms of cloth, the remainder having been disposed of on the road. The messenger from Congo arrived, bringing intelligence that Congo town had almost been cleared out by small-pox, that the king was very ill with it, and all hope of assistance from him was at an end, so there was nothing left now but to speedily retrace our steps to Congo, and thence by the Embomma road to the river and up the left bank. It was very disheartening to be thus thrown back with the season so far advanced, and the prospect of being dropped frequently on the road, but it could not be avoided, and we commenced collecting carriers at once. We have found these country people to be exceedingly timid, superstitious and suspicious, always imagining evil of us, although we acted in the most straightforward manner towards them, concealing nothing of our intentions, and mixing freely with them, in order to accustom them to the white man. They thoroughly believed, at Tungwa, that we had come to find out about the ivory trade, and look for copper and silver at Sundi and Opombo, as the Portuguese had done at Bembe. In estimating the population, they take no account of the women and children, but only those who bear arms.

Banza Umputa musters 136 men, of whom 130 have guns. They have five seasons to the year, which go by two months and a half; they reckon twelve months to the year. July, August, and half of September they call "Sevoo" or summer; half of September, October, and November "Bangala," or dry season; December, January, and half of February "Masanzā," or winter; half of February, March, and half of April "Kundey," heavy rainy season; half of April, May, and June "Kintombo," or Spring. Bangala commences when this (August) moon is finished. No rain falls until Bangala is finished, then follow two months' light rains, and then the heavy rains. September is the month for burning the grass all over the country, and it is the hunting season. Very few of them travel during that time: they calculate 30 days to the month. The marriage customs are rather peculiar. As soon as a young man has built himself a house, and can assure the parents of the girl that he has sufficient money to keep a wife, he can marry. Girls are betrothed at their birth, and the intended husband continues to make presents to the parents, and give cloths to the girl until she arrives at the age of puberty, when she is handed over to him. In the event of a married man dying, if he has a younger brother, his estate and wives are handed over to him. If there is no brother, the wives go back to their parents, and the children are supported by the deceased man's family, and his property sold. They keep no account of the children's ages after they are two years old. A man is not allowed by "fetish" to cohabit with his wife after the birth of a child until it can walk alone. In many villages there is what is called a young man's house. When a boy is about eleven or twelve years old, he leaves his parents' house for this place (only returning for his meals), where he lives with the other young men until he marries. When chiefs are in mourning they never wash their faces, and according to the degree of relationship, the period extends from three to twelve months. Pawning is carried on very extensively—a man will pawn his child, his gun, or his knife to procure cloth or beads when hard up, and if the pawnbroker does not choose to demand repayment, with interest, of what he has advanced, the property becomes his absolutely. Palm trees are abundant, and average five bunches of fruit, equal to a gallon of oil, without taking into account the nuts, and bear two crops annually. This is all wasted; they say it is too much trouble to make it, and they are quite content with what they make by their ground-nuts.

The country from this to the north and east is more open, the valleys are not so deeply undulating, the soil is rich, and, under cultivation, capable of producing anything. After the usual delays and palavers, &c., we commenced our march on the 15th of August, for Congo, which we reached on the 29th of the same month, having been deserted by the carriers three times on the road. Here we found a wretched state of things, the king very ill, half the town dead, and everything looking very desolate; houses nearly all shut up, the men have disappeared, and the women wander about the town neglecting their farms and plantations. All is hushed; the clink clink of the blacksmith's hammer, which so often reminded us of the villages at home, is no longer heard. I passed by his shed to-day, and found it ruined and deserted. There lay the anvil and the tools and the remains of the charcoal fire; but the presiding, where was he? Gone, alas! like many, to the home of his fathers.

It was not until the 10th of October, owing to the great mortality amongst the carriers, that we were enabled to make a start from Congo for Banza Noki, where we arrived on the 22nd of the same month, having great trouble with the carriers on the road, who eventually deserted us at Banza Vokay, and we were compelled to employ fresh ones to reach the river. Here (Lucango) we found ourselves among friends, Mr. Pardo, of Boma, having a factory at this place, and he kindly placed the

house at our disposal. We found the river had already risen 4 feet, and they say it continues to do so until the 21st of December, when it begins to fall. There is a steady current mid stream at present of about 5 knots, breadth 850 yards. Finding, after enquiries, that the kings on this side of the river would not allow us to go to Yellalla, we crossed to the opposite shore, north side of the river, and having pitched the tents, erected huts, and housed the baggage. We paid some visits to the neighbouring kings to arrange carriers, but they all stated that the season was too far advanced, the rains had already commenced, and they could not supply carriers until they were over. Finding, after repeated attempts that nothing could be done, we commenced preparing our winter quarters, cleared some land, and planted it.

We remained here until the 11th of December, but as the natives would no longer sell us food, and we could not catch enough fish or shoot game to keep us, we were compelled to break up the little colony and go down the river to Mussuco, where we were very hospitably received by Mr. Pardo, who was just re-opening a factory there. We built houses for the men, and having a store placed at our disposal, safely housed the cargoes. We remained at this place until the 10th of April. During the time we made frequent excursions to the different chiefs, both on the north and south banks of the river, negotiating for the road, and eventually succeeded, by making very handsome presents to Aurlongo (the King of Banza Noki) in gaining him over. We commenced moving out of our winter quarters on the 10th of April, and on the 17th of the same month heard with profound regret of the death of Dr. Livingstone, through Captain Hopkins, who ascended the river on purpose to meet us and give the intelligence; but conceiving it still our duty to proceed, we pushed on and had just completed arrangements for crossing the river above the falls when the letter of recall from the Society overtook us, and complying with instructions, we, with many regrets at the idea of leaving our work unfinished, when all seemed so full of promise, commenced preparations for the return, leaving good presents with the chief in order to procure a good reception for those who might come after us.

The Congo, which is one of the grandest rivers of the universe, and still awaits exploration, is navigable for steamers to a distance of 110 miles from its mouth, even in the dry season; it floods twice annually, the first and great rise taking place from 10th of September to the 23rd of December, the second from first week in March till nearly the end of June. In 1873 it only rose 9 feet 6 inches with the first flooding, and 2 feet with the second. A very low run was expected at the end of August of this year, owing to the small quantity of rain which fell. There are hundreds of canoes on the river, some of them capable of carrying 3 tons of cargo. A very large trade in nuts and oil is carried on with them between Boma and the towns and markets above the factories. The natives are very skilful in the handling of their canoes, yet a great number of lives are lost annually through the swamping of their frail craft by whirlpools. They stand to paddle, singing the while. The large canoes have two men to steer, and six to paddle; they choose the early morning for descending the river when there is no wind. The fishermen use nets shaped like a spoon, and choose dark nights for their work, one man holding a lighted brand over the water, whilst the other dips up the fish attracted by the glare with the net. For the guidance of future travellers in the Congo country I would suggest that all the carriers be engaged at Sierra Leone, where any number can be obtained for 1s. 3d. a day. From my experience of them I can safely say they will be found to answer every requirement, and the employment of them would render an expedition entirely independent of the natives, who by their cowardice and constant desertion, entailed upon us such heavy expenses and serious delays.

IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

THE above body held their monthly meeting on the 6th (18th) of November. Among the publications of the Society for the month of October were cited the first volume of a Russian translation of Ritter's *Iran*, edited, revised, augmented, and supplied, with a notice of Ritter, his life and works, by M. Khanikof, and a statistical account of the Russian possessions in Central Asia by M. Jahnsen. The latter work contains a detailed account of the Zarafshan by M. Sobolef, a task which has earned for the writer one of the minor gold medals of the Society; and an account by M. Terentief of the Syr-Daria Province. The first volume of Captain Prjevalsky's important work is in the press, and will be out in time for the annual meeting of the Society.

M. WILSON, the Secretary, proceeded to give an abstract of the results of the Amu-Daria expedition, most of the members of which were present at the meeting. The labours of the expedition were concluded about the end of September, and Colonel Stoletof, the commander, reported that the only difficulty in the way of navigation above Nukus, is the inequalities in the channel of the river, and that this difficulty can be met by employing local fishermen as pilots. There is a sufficient depth of water throughout, and the proximity of the navigable channel to the banks on either hand is a great help. Major Wood made a calculation of the mass of water at the mouth of the Amu, and of the same above the first canal, and he arrived at the conclusion that about half the total bulk of water is diverted for irrigation, but sufficient care is not exercised in its distribution, as a good portion is allowed to run to waste in the sands. The Amu rises to its height in July, when the snows in its upper course melt.

With reference to the natural history department, M. Wilson announced that Messrs. Sievertsof and Bogandof had made zoological excursions in the vicinity of Petro-Alexandrovsk and Nukus; M. Smirnof, the botanist, had made collections on the banks and islands of the Amu; and M. Bartot de Marny had geologically examined the Kushkan-Tau Range, Chimbai, Nukus, Shurakhan, Meshekli, and the Sheik Jeli Hills, and from thence carried his investigations on across the Kizil Kum to Samarcand. M. Barbot de Marny had detected an important difference between the geological features of the eastern and western shores of the Aral Sea, the first being limestone, and the second chiefly tertiary deposits, which prevail throughout the Ust Urt. Two members of the expedition, Messrs. Dorandt and Milberg, have remained behind to carry on meteorological observations for the space of a year.

The results of the levelling operations carried on between the Aral and Caspian Seas were telegraphed by Colonel Tillo to the Society, and, from them, it appears that the Aral is 250 feet above the Mertvi Kulduk, or Dead Bay of the Caspian. This vitiates the measurements of Zagoskine, Anjou, Duhamel, Berg, and Struve, while it corroborates, in a measure, those of Colonel Stebnitsky in 1872, who made the Igdy Wells, on the old bed of the Oxus, 191 feet above the Caspian.

Tidings had been received from M. Miklucho Maklay, dated Ti-Panas, in Java, 5th of October (we give a *résumé* of the recent travels of this energetic traveller on another page). In order to co-operate with the approaching Paris Geographical Congress, it was announced that a Committee of the Society had been formed, with Count Lütke at its head, to consider how best that end might be achieved. M. Karazine, a painter, who had accompanied the Amu Expedition, excited much interest by the exhibition of an excellent set of water-colour drawings, which he explained in detail.

M. POLIAKOF then related the result of his researches (instituted at the instance of the Imperial Geographical Society, and of the Natural History Society of the St. Petersburg University) in the physical geography of the

water-parting between the basins of the Baltic, the White Sea, and the Upper Volga. He showed that a plateau, from 900 to 1000 feet in height, near the sources of the Volga, runs in a north-easterly direction with a gradually decreasing height till it reaches an altitude of about 450 feet near the source of the Onega. M. Poliakov's observations proved that the plateau had been originally covered with glaciers. The Valdai plateau is studded with lakes originally formed by the melting of glaciers; the primitive rocks there are covered with more recent formations, among which are large detached blocks of granite, while traces of moraines are very frequent. Examination of the basin of the Sheksua seemed to indicate that two distinct series of lakes had been formed there. M. Poliakov stated that in most places he came frequently upon stone implements, while in other places he had not found a vestige of them, which seemed to prove that the extent of waters formerly was much greater than at present. The destruction of timber-trees, however, he considers as but a remote cause of this desiccation, the more probable one being the physical peculiarity of the soil. He contended from the similarity of the *fauna* that the basins of the Baltic, of the White Sea, and of the Upper Volga must have been originally united, and regular communication possible from sea to sea.

M. Poliakov's paper was received with interest, and after the sections and surveys made by the Amu Daria expedition had been exhibited, and a vote of thanks passed to Colonel Stoletof, the commander, and to M. Brioukhof, the captain of the corvette, the proceedings terminated.

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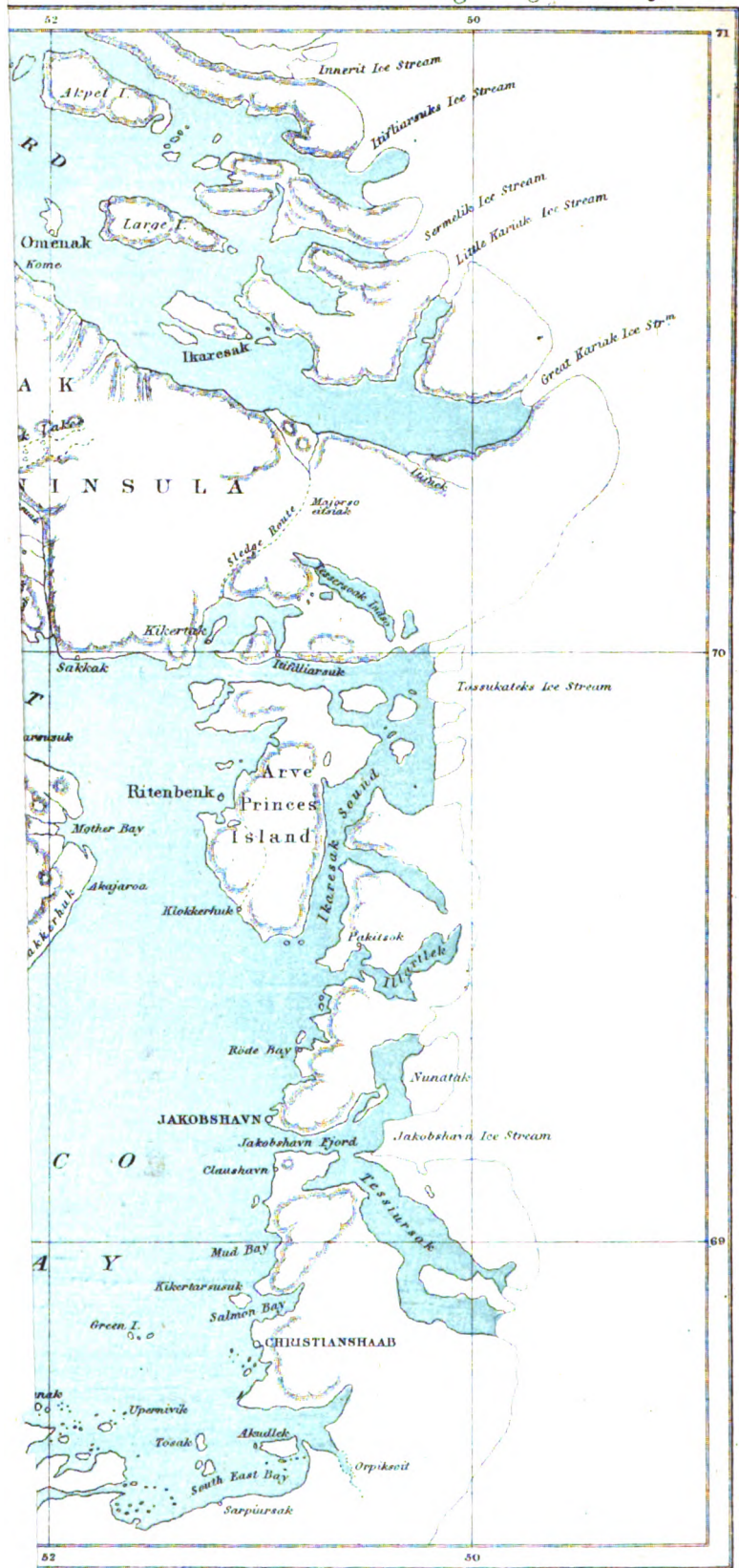
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DISCO BAY, NORTH GREENLAND.

GREENLAND, in the technical language of the "Konglige Grønlandske Handel," or Board of Trade for Greenland, is divided for the purposes of government into North and South Greenland, each of these divisions being presided over by an Inspector, who has under him various local officials, all of whom are responsible, through the Inspector, to the Director of this Board of Commerce, resident in Copenhagen. The region we are describing being situated between the parallels of about 68° and 70° N. latitude may, however, be conveniently styled "Mid-Greenland." It will, however, be understood that the latitude of 66° is the political and commercial division of North and South Greenland.

Disco Bay and Island is probably the best known district in all West Greenland. The bay was once the chief whaling locality. At the southern end of it is the little settlement of Godhavn or Lievly, the residence of the Inspector of North Greenland, and the place where the whaling and exploring ships frequently touch. In all the Arctic books Lievly is a familiar landmark. To our seamen it is the type—an unfavourable one it is to be feared—of the settlements of the Danish Government trading monopoly of West Greenland, and in a few months there is every likelihood that the Arctic Expedition of 1875-77 will obtain its first acquaintance with the northern lands from the region in question. It may be, therefore, interesting to recapitulate, in the briefest possible manner, what we know of this typical Greenland district.

Geography.—The map affixed to this paper* will give the reader a better idea of the general contour of the coast-line than any laboured description. The southern boundary may be said to be the broken group of islands on one of which the settlement of Egedesminde ("The memory of Egede") is built—"like a spider in a web," as the Eskimo, with a power of metaphor unusual with these hyperboreans, describe its situation. The coast-line then trends easterly and northerly until the entrance of the Waigat Strait and the unbroken southern shores of Disco Island are its limits on the north. With this exception the line of coast is broken by inlets and bays, the great ice fjord of Jakobshavn—the chief birthplace of the icebergs of North Greenland, and which at one

time is rumoured by tradition to have stretched across Greenland—being the most noted feature. A few detached islets lie near its entrance. Nowhere are the cliffs high, and on the southern shore they are in general flat and uninteresting. About Christianshaab and further to the north the shores are backed by fells reaching the height of about 1000 or 1200 feet, bare rounded knolls of gneiss, ice-shaven and worn, being their predominating character. Between these higher grounds run birch and willow-covered mossy valleys, bright with running streams and mimic waterfalls during the brief Arctic summer, and generally terminated by great moraines—the bones, if we may use the expression, of the glaciers which at one time filled them, but which have now sought other outlets. Everywhere there are indubitable signs that the extensive *mer de glace* which is believed to now cover the entire interior of Greenland, once extended over the whole, or, at least, most part, of what is now the uncovered or "fast-land" of the Danes. The ice is again beginning to encroach on the land, and everywhere in this vicinity there are proofs of a gradual subsidence of the ground. Islands, on which houses were built high and dry above high-water, are now getting so circumscribed that the natives have to desert them; and one case may be cited of a storehouse which was built on an islet off Claushavn, which had to be removed a few years ago, owing to its floor being now under water.*

If the traveller climbs any of the loftier eminences he finds the whole country dreary in the extreme. No tree or shrub higher than the creeping willow or birch is seen. The bare, ice-shaven, rounded rocks are clothed with a sombre coat of black, horny lichens, and strewed everywhere with the "travelled blocks" of the glacialists. The mossy valleys, and occasional flats, diversified with miniature lakes, formed by the melting of the winter snow, and even yet half-frozen, are about the only physical features to relieve the monotony of bare gneiss or trap. Later in the year the rocks will become gay with flowers; the ptarmigan in their summer plumage will fly up at your feet—the bell-like croak of the raven—almost the only living thing which the Greenlander hesitates about devouring—will make the weird solitude none the less solitary by association; an Arctic fox, with the characteristic impudence of its kind, will bark a "huc! huc!" off the rocks; the Eskimo women will be gathering

* For the use of which we are indebted to the Geological Society of Glasgow, in whose forthcoming volume of *Transactions* it will appear in illustration of a Memoir by the writer,

* See Robert Brown, "Physics of Arctic Ice" (*Quart. Journ. Geol. Soc.*, Feb. 1871), and "Das Innere der Grönland" *Petermann's Geog. Mitt.*, 1871).

“brændsel,” or fuel of birch and turf, in the valleys; and the noisy sea-fowl from other lands—wayfarers like ourselves—will make merry the ordure-whitened rocks. But at present—say in early spring—all is cheerless and lifeless. Eastward lies the “inlands ice,” the great glacier which, like a winding-sheet, envelopes hill and dale, mountain and valley, of the interior in its icy covering; while seaward the winter ice has scarcely yet melted, and is floating about in little floes, mingled with the great icebergs which are every now and again pouring out of the Jakobshavn Icefjord, or floating southward from the many “ice streams” which discharge themselves into Disco Bay and Omenak Fjord.

Geology.—The structure of the country around Disco Bay and the Waigat Strait, is a sort of epitome of the geology of West Greenland. On every side, except that formed by Disco Island, gneiss and other varieties of metamorphic rocks, with occasional spurs of syenite or granite, prevail, giving the scenery a tameness peculiarly characteristic of these rocks as seen in Greenland. On Disco Island we find the geology more varied. Trap alone appears on the Davis Strait side of the island, but on the southern and eastern coasts the trap bursts through strata of coal shale, and sandstone of miocene age, with the exception of a little patch of gneiss and syenite on which the settlement of Godhaven, at the south-western corner of the island, is built. These miocene strata with erupted (or contemporaneous) traps prevail over the rest of the island, and on both sides of the Noursoak Peninsula, as well as on the islands on Omenak Fjord and on Hare Island. Cretaceous strata also appear on the Omenak Fjord side of the Noursoak Peninsula, and probably also at certain places on the Waigat shores. The fossil remains found in these miocene beds consist of numerous land plants and a few insects, all showing that in comparatively recent times a luxuriant vegetation, somewhat similar in character to that of California, or the Southern States of North America, flourished in these Arctic wastes. Luxuriant evergreen oaks, magnolias, and redwood (*Sequoia*), if all different from the Californian species, grew where the nearest approach to a tree at this day is the dwarf willow, creeping along the ground with a stem not over half an inch in diameter, and the whole of which would not cover a soup-plate. These remains have been carefully investigated by Professor Heer of Zurich, and his conclusions may be briefly summed up in his own graphic words, which, on the whole, fairly express the legitimate deductions derived from the study of the Greenland miocene flora. The cretaceous flora is much less rich:—He remarks that, “At the period when the sandstones which compose the smiling hills of Zurich were deposited, a considerable extent of *terra firma* must have existed in the extreme north. To this period the name of miocene has been given, or more generally that of the tertiary period. Our countries had then almost a tropical character. Among the forests of laurels and the tufts of palm-trees lived numerous animals belonging to types which now-a-days occur only in the warm and even torrid zones. Towards the north, indeed, the ground was clothed in a different vesture. Nevertheless Greenland, even at 70° N. latitude, presents a flora which, by its climatic characters, may be compared with that of Northern Italy. This

flora teaches us that in the neighbourhood of the islands of Disco and Atanakerdluk there was once a lake of fresh water, upon the marshy edges of which great beds of peat were formed. These subsequently gave origin to the deposits of coal which appear along the coast. In our marshes it is not rare to see ferruginous water, which covers the soil with a reddish-brown crust. The same took place in the ancient marshes of Greenland: the iron deposited itself upon the plants which fell into the water, and these in their turn contributed to the precipitation and fixation of the iron. By this means has been gradually formed that ferruginous rock, in the bosom of which numerous plants are imprisoned. These fossils show that the marshes were covered with sedges and reeds; but the marsh cypress, the water-pines, the birch, the alder, and the poplar flourished there: for numerous fragments of these plants are covered by a ferruginous deposit. The water trefoil or buck-bean (*Menyanthes arctica*, Hr.) no doubt grew in the marshes in the same way that the existing species (*M. trifoliata*) adorns our moist meadows with its charming flowers: and the burr reed (*Sparganium stygium*, Hr.), the fruit of which has been obtained from the rocks, also formerly raised its bristling head above the waves. The rivulets also brought in leaves from other localities; they conveyed them from the primitive forests; and it is thus that we find their traces in the ferruginous rocks. If we enter into these forests, we shall see a marvellous profusion of trees and shrubs, among which we can distinguish forty-five different species. A tree with acicular leaves (*Sequoia Langsdorffii*, Brogn.) strikes us at once by its enormous proportions. It has left leafy branches in such numbers that there is scarcely a fragment of stone which does not contain its remains; and the remains which the hammer has extracted from the rock enable us to reconstruct the entire tree. It is accompanied by two allied species (*S. Couttsia*, Hr., and *S. longifolia*, Hr.); one of which (*S. Couttsia*) by the configuration of its branches and leaves, vividly reminds us of the *Sequoia gigantea* of California. A *Thuja* had a different aspect, as also the ginkgo (*Salisburea adiantoides*, Ung.), of which the leaves resemble the fronds of ferns, and differ so widely from those of other Coniferæ. The leafy trees are especially well represented; while our existing forests only present two species of oak, North Greenland possessed nine, four of which have been evergreen, like the Italian oak. Two beeches (*Fagus Deucalionis* Ung., and *F. sp.*—), a chestnut (*Cortanea Ungeri*, Hr.), two planes (*Platanus aceroides*, Göp., and *P. Guillelmæ*, Göp.), and a walnut (*Juglans acuminata*), from this forest, resemble the types of the same name known to everybody. Besides these, American species such as the magnolias, sassafrasses, and liquidambar were represented there; and the characters of the ebony tree (*Diospyros*) are to be distinguished in two of the species. The hazel, the sumach (*Rhus*), the buckthorn, and the holly, the guelder rose, and the white (*Cratægus*), probably formed the thickets at the borders of the woods; while the vine, the ivy, and the sarsaparilla climbed over the trees of the virgin forest, and adorned them with garlands. In the shadow of the wood grew a profusion of ferns, which covered the soil with their elegant fronds. The insects which gave animation to these solitudes are not all lost. The impressions of these which have reached us show that little *Chryso-*

melas and *Castilida* enjoyed themselves in the sun, and large *Trogita* pierced the bark of the trees, while charming *Cicadella* leaped about among the herbage. This picture is not a dream of the imagination. Plants and animals have all passed under my eyes." In all, about one hundred and sixty-seven of miocene plants have been discovered in Greenland, and of these thirty-two were discovered by us.*

The coal, like all tertiary lignites, is of a poor quality, but yet, when mixed with English coal, it forms a good fuel for household and even for steaming purposes. Admirals Inglefield and M'Clintock both used it in their vessels. It is mined to some small extent for the use of the Danish settlements around the bay.† Soap-stone (steatite) is found in some places in the primitive rocks, on the southern shores of Disco Bay. At one time it was extensively employed by the natives for making various domestic vessels, but is now much less used, owing to the introduction of vessels of iron, copper, and tin, amongst them. There is no other economic mineral, cryolite being only found in one locality—Arsut Fjord—in South Greenland.

Climate.—A locality situated in 70° N. latitude cannot be expected to be greatly favoured by climate. In the winter the cold is extreme, and the ground generally thickly covered with snow from September to May or early June. During this period the whole sea is covered with ice, and the Danes and Eskimos visit from settlement to settlement, in sledges drawn by dogs, which course over the frozen sea at the rate of 10 or 12 miles an hour. During the summer, under the four months of continual daylight, the snow soon melts over the lower lands, and the heat is often extreme. Mosquitoes are troublesome, and there being no shelter from the rays of the sun reflected from the snow, ice, and bare rocks, travelling is frequently very oppressive. The climate is, however, uncertain. In June I have experienced a snowstorm. Rain often falls. The day may be bright and sunny in the morning, and in the evening snow, sleet, and all the concomitants of spring or winter. The climate of Jakobshavn—latitude 69° 13' 26" N.—from the mean of many years' observations may be taken as a type of the Disco Bay meteorology:—

January ...	÷ 2'4 F.	July ...	... + 45'4 F.
February ...	0'3	August ...	... 42'4
March ...	8'2	September ...	... 34'6
April ...	+ 18'8	October ...	... 25'1
May ...	32'5	November ...	... 12'5
June ...	41'5	December ...	... ÷ 7'5
Winter (mean Temp.)	... ..		... ÷ 3'4 F.
Spring "	... ..		... 19'9
Summer "	... ..		... + 43'1
Autumn "	... ..		... 24'1
Whole Year "	... ..		... 22'5‡

* "Om de miocena växter, som den Svenska expeditionen, 1870, hemfört fran Grönland, af Oswald Heer." (Öfversigt af Kongl. Vet.—Akad. Förhandl, 1873, No. 10.) See also *Flora fossilis arctica*; *Philosophical Transactions*, 1869; *Les Dernières Découvertes dans l'extrême Nord* (*Bibliothèque Universelle et Revue Suisse*, t. xxxiv., pp. 512—543; *Les Régions Polaires du Nord* (*Bibl. Univ.*, Jan. 1867), &c.

† For a fuller description of the geology of Greenland the reader may be referred to my "Geological Notes on the Noursoak Peninsula and Disco Island, North Greenland" (*Trans. Geological Society of Glasgow*, 1873-4), and the works there cited.

‡ *Collectanea Meteorologica* Fasc. iv. (1856). Rink, *Grönland Geographisk og Statistisk beskrevet*. Andet Bind (1857) Tillæg Nr. 8.

During the short summer season vegetation springs up apace, and soon comes to maturity. The weather in September is uncertain, showers of snow falling, and the nights being very dark and cold. By October "bay ice" begins to form in quiet bays or inlets, and the ground gets its winter mantle of snow. The soil freezes hard to the depth of several feet—where it is so thick—and all nature slumbers. "About this time," to use the jest which Benjamin Franklin puts into the mouth of his "Poor Richard" under the head of January, "there may be expectation of much cold and snow in Greenland."

At Jakobshavn the prevailing winds during the summer are S.W., and during the winter E., which are also, taking the mean of the whole year, the prevailing directions. Up the inlets during the summer, generally in the afternoon, a cold icy wind blows from over the frozen interior of the country.

I may conclude these brief remarks on the meteorology by adding that all the winds blowing from the east are cold, owing to their coming across this inland ice, which, so far as we yet know, covers all the interior.*

Danish Settlements.—The trade of Danish Greenland—i.e., the western shores from Cape Farewell to about 73° N. latitude—is a strict monopoly of the Danish Crown, and is administered by Government officials, solely for the benefit of the natives. The principle adopted is to buy the natives' blubber, skins, ivory, &c., from them at a low price, but also to sell them articles of European manufacture, which are necessary to their comfort, at an equally low figure: while coffee and other articles of luxury are sold at a good profit. Any surplus which remains over is credited to each district, and expended for the public good by the little local parliaments or *Partisoks* which are in every district, and the members (*Partisats*) of which are elected by universal suffrage.

These Danish settlements are known as "colonies," and each is presided over by a "Colonibestyret"—or, literally, "best man in the colony"—who is responsible to the Royal Inspector. These officials are not paid highly, but as the Danish colonial service is at the best but a poor one, there is no difficulty in filling the posts by responsible men. In every settlement there is also an assistant, who for some time serves on probation as a "volunteer"—a cooper, carpenter, and, if the settlement is large, a Lutheran priest and a schoolmaster—generally an educated native. These settlements are not lively places; indeed I know they are dull beyond imagination, nothing disturbing the even tenor of the inn-dweller's life save the little gossip how the carpenter's daughter is to be married to Peder, a mighty hunter of seal and white whale; how Hans Pangeitok has got a new kayak; speculations as to the probable arrival of the 'Marianne,' the annual ship from Kjöbenhavn, and the ball which is sure to take place in the storehouse immediately thereafter, or connoisseurish dissertations in regard to the quality of the last brew of beer which Johannes has concocted. This last is a very important matter. Yet, looking back on our life in these settlements I can honestly say, that it is with a feeling almost akin to affection that, in the more refulgent light of other days, I remember all the

* Disco Island is a miniature of the continent. It is an elevated plateau also covered by a *mer de glace*, which finds an outlet in miniature glaciers creeping to the coast.

kindness we used to receive—all the good-natured, fur-clad neighbours we had—the cracked bell that rang for “Danish Church” once a fortnight, in the crazy, wooden steeple—and all our little jokes, annoyances, and pleasures. We lived in a society of our own, which was not large certainly, and had the advantage or disadvantage that everybody—with their faults and virtues—were well known to each other. There was a good deal of tittle-tattle—some scandal of the type which is not frozen out of Greenland—much fiddling and dancing—many Sunday supper-parties, with the midnight sun streaming in at the windows—some drinking of arrack toddy, a brief flirtation or two, and even a little marrying and giving in marriage. In these settlements may be found many pleasant, and even accomplished ladies, the wives and daughters of the Danish officials. Pianos are not unknown, and literature is cultivated. You may even find the Tauchnitz edition of the best English authors in the “Governor’s” house. The *Illustrated London News* is “taken in,” and altogether the graces of civilized life are cultivated to such an extent that, as it is possible that this article may be read in Greenland, and criticised with the severity bred of an isolated life, I forbear, as I value my good name, to hint even further at the mysteries of Arctic “Society.” At few of these settlements are there more than three or four Danes. At Christianshaab there is only the Colonibestyryer’s family, a carpenter, and a cooper; at Claushavn, only a “volunteer,” or assistant in charge; at Jakobshavn there is the governor and his family, two or three clergymen, a “seminary” built of turf, for the education of native catechists, a surgeon, and one or two workmen; at Ritenbenk, two; at Sakkak, there is only one; at Ujarsusuk, another; while at Godhaven there is the Royal Inspector of North Greenland, the Colonibestyryer, and one or two assistants. In addition, there are from 30 to 200 or 300 Eskimos at each of these ports. Ikamiut, Akunak, Ujarsusuk, Pakitsok, Sakkak, Dog Island, &c., are only outposts, presided over by an inferior official responsible to the Colonibestyryer of his district, and called an “Udligger,” or “outliver.” He is generally a carpenter or a cooper, who can, except on very extraordinary occasions, be treated with a reasonable quantity of rum, an accomplishment exceedingly rare among the minor Government officials in his Danish Majesty’s Arctic possessions. Jakobshavn is the largest of these settlements, and has the pre-eminence of being possessed of a wooden church, built of drift logs, tarred all over. Egedesminde has also a church, but it is hardly an orthodox one. It has no steeple, and, accordingly, the Jakobshavnians quite crow over the Egedesmendians.*

Eskimo Settlements.—In addition to the Eskimos who gather round the Danish settlements there are numbers who live, especially in the summer, at little fishing stations, killing white whales, seals, hunting, &c. In the winter they generally crowd near the “colonies.” Altogether there are about 9500 Eskimos under the Danish crown, and of these perhaps under 500 are scattered about Disco Bay and the Waigat. They are all civilized, most of them able to read and write, are nominally good Lutherans, but rather effemi-

nate, and with a national distaste for soap and water. The Danish Government treat the natives with the most paternal care; no spirits are allowed to be sold to them, schools are provided, and altogether the rule of the little Northern Kingdom contrasts very favourably with the treatment we have given the aborigines in most of our colonies. Theft is practically unknown in Danish Greenland, the only case of late years being performed under the auspices of “Samuel,” a young gentleman, who, while employed in the ‘Fox’ under Sir Leopold M’Clintock, acquired habits of life incompatible with his limited income, and accordingly, after the expenditure of his wages he resorted to habits which secured for him the unenviable notoriety of having three dozen administered to him in front of the flagstaff at Godhaven. Among Samuel’s other accomplishments may be classed the English language—after the dialect of the fo’c’s’le—finely flavoured with “the oath of British commerce.” Though in civilization the Danish Greenlanders compare most favourably with the wild Smith Sounders, and the savages of the western shores of Davis Strait, yet it must be confessed that in skill and courage as hunters, the wild Eskimos have an immense advantage over their civilized brethren.*

Plants.—The vegetation around Disco Bay and Waigat Strait is, during the brief summer, rather luxuriant. The rocks are bright with mosses, and gaily-coloured flowers peep out from the crannies. In shady, moist localities several ferns may be found, and on the sunny flats there are quite Arctic wild gardens. The alpine rose (*Rhododendron lapponicum*), and the yellow poppy (*Papaver nudicaule*), one of the hardiest of alpine plants, climb to the top of the highest eminences, and the poppy will be found even after the *Rhododendron* has disappeared. The dwarf birch (*Betula nana*) and various dwarf willows are found in the valleys and elsewhere. In Upernavik district, and at the top of the south-east bay, the birch is said to grow high enough in localities to cover the reindeer. Such giant shrubs are looked upon with great pride by the natives. They take visitors to see them, and point to these extraordinary specimens of vegetation with an air as of “See this and—die!”

In a summer’s botanizing, greatly broken in upon by other work, I found, in the vicinity of Disco Bay and the Waigat Strait, about 129 species of flowering plants and ferns, viz.: a *Thalictrum*, 3 species of *Ranunculus*, a poppy, 2 *Cochlearias* or scurvy grasses, an *Arabis*, a *Cardamine*, 7 *Drabas*, (two or three of which, though not described as new, were in all likelihood so), a *Silene*, 3 species of *Lychnis*, 2 species of *Cerastium*, 5 *Stellarias*, 2 species of *Arenaria*, a *Montia*, an *Alchemilla*, a *Dryas*, 4 *Potentillas*, a *Sibaldia*, 8 *Saxifrages*, a *Hippuris*, 2 *Epilobiums* (one probably new), 2 *Campanulas*, a *Vaccinium*, 2 *Pyrolas*, a *Diapensia*, 2 *Cassiopes*, a *Phyllodoce*, a *Ledum*, a *Loiseleuria*, a *Rhododendron*, 2 *Erigerons*, an *Artemesia*, a *Gnaphalium*, an *Arnica*, a *Taraxicum*, 3 species of *Pedicularis*, a *Veronica*, a *Bartsia*, a *Pinguicula*, an *Armeria*, 2 *Plantagos*, a *Polygonum*, an *Oxyria*, a *Betula*,

* The English reader who may care to know more of Greenland life, and the Greenland Eskimo, may be referred to two articles—the paternity of which I may now blushing acknowledge—in, respectively, the *Cornhill Magazine*, for June 1868 (“Friends in High Latitudes”), and in the *St. James’s Magazine* for February 1870 (“In Hyperborea”).

* On the map the positions of these places are marked chiefly from my own observations with the sextant.

an *Empetrum*, 6 willows, a *Tofieldia*, 3 species of *Juncus*, 3 species of *Luzula*, a *Scirpus*, 3 species of *Ériophorum*, 7 species of *Carex*, an *Alopecurus*, a *Hierochloa*, a *Phippsia*, a *Calamagrostis*, a *Trisetum*, an *Elymus*, an *Agrostis*, 9 species of *Poa*, 2 species of *Glyceria*, a *Festuca*, 2 Club Mosses, 2 species of *Equisetum*, a *Cystopteris*, and 2 Woodsias. In addition there was a large number of lichens found (about twenty-two of which were entirely new to science), many mosses, fungi, *Hepaticæ*, and freshwater and marine Algæ—the latter, though not specially sought for, being almost equal in number to the whole of the Algæ previously known from the Arctic seas.* The most characteristic plant is the "Qvan," or *Angelica officinalis*, which is only found on Disco Island, in all North Greenland. It is, however, abundant in the vicinity of the South Greenland fjords, and particularly in the district of Julianehaab, so much so indeed, that the natives say that Disco was once a portion of Julianehaab district, and that a great angekok, or wizard, towed it north. He would have towed it still further had not a rival cut the rope! The plant is used in Greenland as an anti-scorbutic. On its leaves is occasionally found the pretty land-shell *Vitriina angelica*. By the borders of the stream which flows through Lyngemarken—"the heath field," opposite the settlement of Godhaven—I also found the "ladies' mantle" (*Alchemilla*) in great abundance and of much luxuriance. This stream is warmer than the other waters in the valley, and hence the superior luxuriance of the vegetation in its vicinity.

The natives use, in addition to blubber, turf, birch, *Empetrum*, willow, *Andromeda (Cassiope)* *Ledum*, *Vaccinium*, &c., as fuel, and eat the berries of the *Vaccinium*, *Empetrum*, &c.

In South Greenland various plants are used hygienically; but with the exception of the *Angelica* and some Algæ, few are so used in the vicinity of Disco Bay. The Iceland moss is rarely, if ever, used by the natives.

Animals.—Hunting and fishing form the sole occupation of those natives who are not in the service of the Danish Government. The methods of hunting would take too long to describe, and would also be foreign to the nature of this sketch. I may, however, mention the animals which are chiefly hunted for food or for their ivory, blubber, or skins. The white bear (*Ursus maritimus*) is almost extinct in Mid-Greenland. During the whole summer we passed there we not only never saw, but never heard of one. In the northern district of Upernavik they are more common, and in South Greenland, where they arrive from the east coast with the "Spitzbergen ice-stream," they are frequently killed. Now and then one is killed in spring in the vicinity of Disco Island, having apparently wandered south, or having been drifted from the north or west on the ice.† The Arctic fox (*Vulpes Lagopus*) is common. The native dog (*Canis*

familiaris, var. *borealis*) is getting gradually decimated by the peculiar disease which has made its appearance of late years in Greenland, but which, when I last heard from Greenland, had not spread south of the ice fjord at Jakobshavn. The cat has become domesticated, and follows the Danish ladies to the most northerly abode of civilized man. The lemming is entirely unknown on the west coast, except in the more northern parts of Smith Sound, where, I am informed by Commander Markham, Dr. Bessels, of Hall's American Expedition, obtained one or more specimens. It is also found in high latitudes on the east coast—pointing to a peculiar distribution of life, which I may, in another place, have to touch on. The musk ox is entirely unknown south of the glaciers of Melville Bay. The mouse and rat are regularly introduced every summer with the European ships, but rarely survive the winter. The Arctic hare (*Lepus glacialis*) is common. The reindeer (*Rangifer tarandus*, var. *Grœnlandicus*) is now so rare in the vicinity of Disco Bay that few natives care to go hunting it. On Disco Island, where it was so common in the days of Crantz and Fabricius, it is believed to be now extinct. During the summer of 1867, when we were there, only five were killed in the district of Ritenbenk. The yearly average had been about twenty or thirty, but the reindeer-hunting days are nearly over in that section. In the districts of Jakobshavn, Claushavn, and Christianshaab, I did not hear of one being killed. At Claushavn a few natives went out hunting, but met with bad weather, and returned, having shot nothing, and only seen two animals altogether. Great quantities are, however, still killed in the northern and southern districts of Greenland, but the number yearly killed, which, at one time, was from 10,000 to 20,000, is now on the decrease. The seals are, however, the main staple of the Eskimo hunt. Six species—*Callocephalus vitulinus*, *Phoca (Pagomys)*, *fœtida*, *Phoca (Pagophilus)*, *Grœnlandica*, *Phoca barbata* and *Cystophora cristata*—are the species found. Large numbers are killed both in summer and winter, but chiefly on the ice-fields during the latter season. The walrus is not a regular denizen of Disco Bay. The "right" whale (*Balœna mysticetus*) is now only a rare visitor. At one time it was killed in great numbers in this locality. Klokkerhuk was a special station kept up for the convenience of the "fishing," and at the other settlements this giant member of the Arctic fauna was killed in great numbers.*

In addition, the English and Dutch whalers killed great numbers in the bay. It was, indeed, their favourite locality up to the years 1820 or 1830. Four species of fin whale (*Physalus antiquorum*), *Bœlenoptera gigas*, *B. rostrata*, and *Megaptera longimana* are also now and then seen in the bay, though their favourite haunt is the cod-banks of Rifkol to the south. The spermaceti (*Catodon macrocephalus*) has not been recorded in the bay itself, but one was said to have been killed a few years ago near Proven, further north. The killer (*Orca gladiator*) pursues the right whale on its northward, westerly, and southerly migrations. The white whale (*Beluga Catodon*) and the narwhal (*Monodon monoceros*) are also often killed, especially in the winter, at the open places in the ice. The last two species named are, however, migratory, and

* See my *Florula Discoana*: Contributions to the Phyto-Geography of Greenland within the parallels of 68° and 70° N. latitude (assisted by Messrs. Oliver, Carrington, Lawson, Lauder Lindsay, Croll, Dickie, and Smith) in *Trans. Bot. Soc. Edin.*, vol. ix.: Lauder Lindsay in *Trans. Bot. Soc.*, vol. x., and in *Linnean Transactions* (description of Lichens discovered by me), 1870, &c.

† A wolf which had apparently crossed Davis Strait on the ice was, in the spring of 1869, killed near Godhaven. It is not a member of the Greenland fauna.

* See Reinhardt in Ray Society's *Memoirs on the Cetacea*.

desert the bay during the summer months. During the time we passed in that vicinity, in 1867, we never saw either, though both were exceedingly familiar to me in the much more extended voyage I made in the Spitzbergen Sea, Davis Strait, and Baffin's Bay in 1861. The other cetacea now and then seen in Disco Bay are *Delphinus euprosyne*, *Lagenorhynchus albirostris*, *L. leucopleurus*, *Phocæna communis*, *Globiocephalus svineval*, *Hyperoodon butzkopf*, and *H. latifrons*, the latter being a doubtful species, and, indeed, it is a question whether the three species preceding it are visitors, except on very rare occasions, to Disco Bay, being usually found near the mouth of Davis Strait.

All the more common Arctic birds visit Disco Bay in the summer. Most of them, with the exception of the ptarmigan, and some of the raptorial birds, migrate during the winter, returning again when the snow melts off the lowlands, and the ice breaks up on the sea. There are no reptiles in Greenland, but the salt-water fishes are numerous—about seventy species having been already recorded. Most of these are also in the Disco Bay region. The shark (*Læmarxus borealis*) fishing forms a considerable branch of industry. The cod and halibut banks are chiefly on Rifkol, but the small halibut (*Hippoglossus pinguis*, or "Kalleraglek") is caught in Disco Bay. Among the Danes, when sliced and dried, it forms a favourite dish.

The species of *Cottus* (*Grænlandicus* and *scorpioides*) or "kaniok" is the fish chiefly caught by the Disco Bay natives for food. The fishing of it is, nevertheless, considered among the natives as an occupation beneath the dignity of anyone but boys and old men, numbers of whom may be seen patiently angling for them from the edges of cliffs and rocks. About six species of *Salmo* are found in Greenland. Most of these are found in our district. Both trout and salmon are excellent, though with a thick layer of fat under the skin. The natives do not seem to care much for them. The invertebrata of Disco Bay are numerous, mollusca, echinodermata, crustacea, polyzoa, hydrozoa, &c., abounding, though to nothing like the extent the lower forms of animal life swarm on the Rifkol cod-banks. The sea will be sometimes thick with the most beautiful forms of aclephæ. A zoologist skilled with the pencil—for it is next to impossible to preserve these fragile animals in a condition fit to be identified and figured with any certainty—could reap a rich harvest in the Arctic Seas. In shallow water, off the shore, life is scarce, the continual grinding of the icebergs disturbing the bottom or destroying animal life. The shark's stomach is often an excellent repertory of the rare deep-sea forms which it is difficult for the dredge to reach. Insect life is poor; a few butterflies are seen during the summer months, some coleoptera, a few diptera, hymenoptera, &c., go to make up the limited insect fauna of Disco—Island and Bay.

ROBERT BROWN.

Dr. G. Schweinfurth has been appointed Director of the Khedive's Natural History Museum and Botanical Gardens at Cairo, and will leave Berlin in the course of the present month in order to enter upon the duties connected with this office, for which he is so eminently qualified.

THE VOYAGE OF THE 'CHALLENGER.' VI.

THE section of the voyage of the 'Challenger' contained in the October number (1874) of the *Geographical Magazine*, being that comprised between quitting the Cape of Good Hope and her arrival at Melbourne, with the account of her visit to the southern isles of the Indian Ocean and the Antarctic Regions, towards the Termination Land of Captain Wilkes, was considered to have been brought to a natural termination; but as some very interesting remarks on the temperature of the sea water between latitude 65° 42' S. and Australia have reached England from Captain Nares, it is believed to be advantageous not to delay its production, and, therefore, this chapter may be considered in the light of a sequel or addendum to the section.

* During the voyage from Kerguelen to Australia, five serial temperature observations were obtained between the Antarctic circle and the 54th degree of S. latitude, and four between that parallel and Cape Otway. As these observations are highly important, a full notice of each is appended, in order to afford every possible facility for discussion, and also to indicate what data are still required.

Owing to finding in southern latitudes a cold stratum of water situated between the surface stratum and one underlying it, both of which were of a higher temperature, it was only possible with the instruments on board to ascertain with certainty the temperature of the upper part of the lowest stratum, the indices of the thermometers having already registered a higher and lower temperature than that of the lower part. All the observations, however, agree in denoting that at a depth of from 80 to 200 fathoms there is a stratum of cold water lying intermediate between the superheated surface water and a warm underlying layer, which latter is evidently the continuation towards the cold regions of the main oceanic flow of water.

This cold stratum first makes its appearance in about latitude 52° S., where it is 32°·5 Fahrenheit. As the ice is approached it gradually decreases in temperature, until in latitude 66° it is found to be 29°, nearly the freezing-point of salt water. The warmer stratum of oceanic water underlying it also gradually decreases in temperature as higher latitudes are obtained, and from this it may be confidently reasoned that farther to the southward the temperature of the water from the surface to the bottom, will be found to be nearly uniform, at from probably 29° to 30°, but in that case it can scarcely account for the rise in temperature of the bottom water to 32°·5 in latitude 52° S., only about 1200 miles from its source, where we know that afterwards it retains that temperature without alteration for 3000 miles, until it reaches the Equator in the Atlantic Ocean.

During the winter season the ice at the surface must necessarily be colder than the water underlying it; it is, therefore, highly probable that the cold wedge of water found near the surface is merely the remains of the winter cooled sea, which has not sufficient time during the short summer to recover its temperature; it is also probable that during the winter, the solar

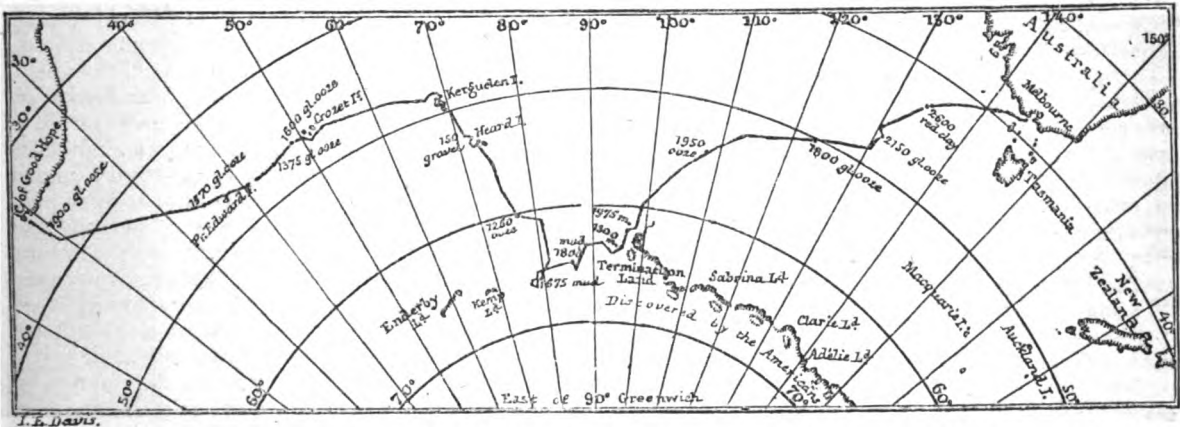
* From "Remarks on the Temperature of the Sea Water between latitude 65° 42' S. and Australia, by Captain G. S. Nares, R.N."

heated surface-belt is entirely removed, and that the sea, as far north as at least the 63rd parallel, becomes frozen over, the frequent gales breaking up the field-ice, and converting it into pack. It is noticeable that the temperature of the underlying stratum was, on each occasion, found to be about one degree warmer than the surface-water; but these observations must, until further information is obtained, be considered somewhat hypothetical.

Taking the depth of flotation of an iceberg to be 200 fathoms, so long as it remains south of the 64th parallel of south latitude, it floats in water too cold to thaw it; therefore, with the exception of the few which have returned south from lower latitudes, and those broken by collision or some local weakness, they are all table-topped, with the line of flotation remaining the same as it was when they originally broke away from the glacier. Between the 64th and 60th parallels of latitude, both at the surface and below a depth of 100 fathoms, the water is sufficiently warm to melt those parts with which it comes into contact; at the surface a notch is melted out horizontally all round the berg, and, at the lower part, its side and the whole surface of the bottom is exposed to the decaying influences of warm water, the intermediate body, floating in a cold

The coldest bottom temperature registered in the Antarctic Sea, north of latitude 54° was 32°·5. In latitude 54° it was 31°·1. In latitude 61° it was 30°·2, but these two last readings require corroboration. To the southward of 61° it certainly was not warmer than 32°. The coldest temperature registered in the Faroe channel, during the cruizes of H.M.S. 'Lightning' and 'Porcupine,' in 1858 and 1869, was 29°·5, which would agree well with that of the coldest water found in the Antarctic regions.

The section between latitude 53° 55' S. and Cape Otway shows the gradual increase in the temperature of the surface water as we proceed north. The great thickness of the stratum between 45° and 50°, compared with the contraction of that between 40° and 45° is peculiar; the latter is about the same breadth as in the South Atlantic, but it has here been pressed down some 50 or 100 fathoms by the disturbed stratum above it. The disturbance in the latter can only be accounted for by supposing it to be caused in some way by the banking down of the water carried to the eastward by the westerly wind drift current on its meeting the coast of Tasmania, and the warm east Australian current running to the southward there; but this is merely conjectural.



stratum, remains intact; the line of flotation is therefore continually changing, but seldom sufficiently so to immerse the original top of the iceberg.

Whether the immense number of icebergs, thawing as they float slowly along in those seas, help to produce or maintain the cold wedge is a delicate question; but the fact that it extends north just as far as the icebergs did in March would point to there being some connection between them.

The fresh water, thawed from the lower part of the iceberg at a temperature of 32° (such water being lighter than the salt water which was the means of thawing the berg), would rise towards the surface, but quickly becoming heavier as it mixes with the salt water, and also meeting with warmer and therefore lighter water, which itself has been plentifully fed with fresh water from the melting of the upper part of the berg, it remains in suspension, as it is colder than the warm underlying stratum it should intermix with it, but apparently does so very slowly. Taking the number of icebergs in sight on the 14th February as an average, and allowing the side of each to be a quarter of a mile in length, the amount of cold given out by them may be judged of by the fact that they occupied one-fifteenth of the surface water.

On the 14th February 1874, in latitude 65° 42', the most southerly station at which temperature observations were obtained, the surface water was 29°·5, the air 33°. The ship was about 1½ mile from the edge of the pack ice, with many icebergs around, forty-eight being counted within a horizon about four miles distant; the average height out of the water of the bergs was from 150 to 200 feet; most of them were table-topped, and had changed very little from the virgin state in which they broke away from the edge of the glacier, and must therefore have been swimming in water of a depth of from 200 to 300 fathoms.

Previous to immersion all the thermometers were cooled, in a mixture of ice and salt, to a temperature of 30°·2. The thermometers used at 50 and 100 fathoms each registered a slight change in the maximum index, which was probably due, either to an error in reading off, or to a slight defect in the instruments, as the maximum indices were frequently found to alter their positions slightly on entering cold water. The minimum index of each fell to 29°, proving that they had entered or passed through a cold stratum of water. The six thermometers used at the greater depths of 300, 500, and 1,675 fathoms, each registered a decidedly higher maximum tempera-

ture, showing distinctly that they had entered or passed through a warmer stratum of water than those used between the surface and a depth of 200 fathoms. The minimum indices all registered 29°, agreeing exactly with the six used at the lesser depths.

It is impossible that the thermometers could have been affected in their momentary passage through the air, which was at a temperature of 33° from the sounding-bridge to the water's edge, as the utmost care was taken to keep the outer case filled with the cooling mixture until the immersion of the instrument,

mum index fell to 29°·2, indicating a colder stratum of water. At 100 fathoms, the maximum index rose to the temperature of the surface water, the minimum fell to 29°, which was slightly colder than that at the depth of 50 fathoms; but as two other thermometers sent down to a greater depth, and which must, therefore, have passed through this cold stratum, did not register the 29°, the temperature of 29°·2 has been adopted as existing at 100 fathoms. The maximum index of the one thermometer sent down to 300 fathoms, rose from 33° to 33°·8, but as the two sent down to the bottom, and which must have passed

ISOTHERMAL TABLE BETWEEN THE CAPE OF GOOD HOPE AND AUSTRALIA, TO THE ANTARCTIC CIRCLE.

Depth.	14th February. Lat. 65° 42' South.				19th February. Lat. 64° 37' South.				26th February. Lat. 62° 26' South.				11th February. Lat. 60° 52' South.				3rd March. Lat. 53° 55' South.						
	No. of Fathoms.	Previous to Immersion.	Maximum.	Minimum.	Accepted Result corrected.	Previous to Immersion.	Maximum.	Minimum.	Accepted Result corrected.	Previous to Immersion.	Maximum.	Minimum.	Accepted Result corrected.	Previous to Immersion.	Maximum.	Minimum.	Accepted Result corrected.	Previous to Immersion.	Maximum.	Minimum.	Accepted Result corrected.		
Surface	...	...	...	...	29.5	...	...	...	32	...	...	...	...	33	...	...	34.5	34.5	40	40.5	...	37.2	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	35.5	35.5	34	34	...	36.8	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	35.8	35.8	33.5	33.5	42	42	36.8
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	40	40	31.2	31.2	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	35.5	35.5	30	30	40.8	40.5	36.6
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	35.5	35.5	30.2	30.2	41	41	36.6
50	30.2	30	29	29	29	31.4	32	29.2	29.2	...	...	...	...	...	...	...	35.5	35.5	30.5	32.2	41	41	36.6
60	30.2	30.5	29	29	29	31.4	32	29.2	29.2	...	...	...	...	...	...	...	35.5	35.6	32	32.2	41	41	36.6
70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	36.5	36.5	32.2	32.2	40.5	40.5	36.6
80	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	36	35.2	32.2	32.2	41.5	41.5	33
90	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	34.5	34.5	32.5	32.2	42.5	42	32.5
100	32.2	30	29	29	29	31.6	31.8	29	29.2	...	...	...	...	...	...	...	35	34	32	32	40.5	40.5	32.7
150	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	35.8	35.8	32	32	43	43.2	32.8
200	30.2	30.5	29	30.5	30.5	...	...	...	...	31.8	31.8	31.8	31.9	35	34	32	32.5	32.8	31.8	Rejected	...	...	...
250	...	...	...	...	...	...	...	...	...	32.5	32.8	31.8	34	35.5	36	31.8	33	34	32	34	...	...	...
300	30.2	30.5	29	30.5	30.5	...	...	...	...	31	34	31	34	34	35.2	32.8	32.5	34	31.8	34	42.5	43	33
350	...	...	...	...	...	...	...	...	...	32.5	31	31.8	34	35.5	35.8	32	...	...	...	...	...	...	...
400	...	...	...	...	32.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
450	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	42.8	43	32.6
500	30.2	32.8	29	32	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bot- tom	30	33	28.8	32 to 28	32	31	32.9	29.3	32 to 28.2	...	34	31.3	30.2 to 1975	41	41	32	...	...	...	...	42.5	42.5	32.8
	30	33	28.8	28	28	31.5	33	29	28.2	...	...	...	...	41	41	33	...	...	...	...	...	...	31.1

and, on recovery, each thermometer was detached from the line and read off before the mercury had sufficient time to attain a higher temperature than that of the surface water, viz., 29°·5. The temperature of the bottom water could not have been warmer than 32°, or colder than 28°.

On the 19th of February, in latitude 64° 37' S., the temperature of the surface water was 32°, that of the air 30°; a large number of icebergs were in sight. At a depth of 50 fathoms the maximum index, which before immersion registered 31°·4, rose to 32°, which was the temperature of the surface water; the mini-

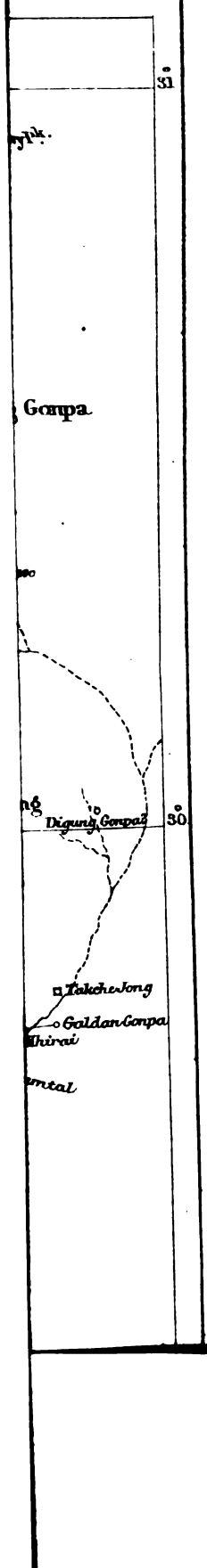
through this stratum, only registered 33°, that reading has been adopted.

The bottom temperature, at 1800 fathoms, as registered by two thermometers, was between 32° and 28°.

On the 21st of February, in nearly the same latitude, and under the same circumstances of temperature of air and surface water, a few observations showed that with the surface at 32° the temperature of 29°·3 was reached at a depth of 40 fathoms.

On the 26th of February, in latitude 62° 25', temperature of the air 35°·5, that of the surface water





ranging from 32° to 33° ; a great number of icebergs were in sight. Previous to immersion the thermometers were cooled in ice and salt to a low temperature. At 100 fathoms the indices of two thermometers did not alter, although they had been cooled to a temperature below that of the surface water, probably passing too quickly through the narrow belt of superheated surface water to take its temperature. A third, which before immersion was set at $32^{\circ}5$, was afterwards sent down to the same depth, the maximum index indicated that it had passed through the surface stratum at $32^{\circ}8$, and the minimum that it had entered the cold stratum of $31^{\circ}8$; the mean minimum reading has, therefore, been adopted as the temperature for that depth.

At 150 fathoms, two thermometers registered a warm stratum of 34° , and the minimum index showed that it had passed through the cold intermediate stratum of 32° . This was also confirmed by the two thermometers sent down to 200 fathoms; and one sent down to the bottom, for each of them registered a maximum temperature of 34° , and a minimum of at least $31^{\circ}8$. A second thermometer registered the maximum temperature at the bottom, at 195 fathoms, at $31^{\circ}3$ (half a degree colder than that registered by the first thermometer, and therefore probably the correct temperature of the water at that depth), this corrected for pressure becomes $30^{\circ}2$; the bottom water was therefore not warmer than $32^{\circ}9$, or colder than $30^{\circ}2$.

On the 11th February, during our passage to the southward, when in latitude $60^{\circ}52'$, an iceberg (the first one seen) was about 5 miles north of the ship, while the serial temperatures were being taken; temperature of the air $35^{\circ}5$, sea surface $34^{\circ}2$. Previous to immersion the thermometers, with the exception of those sent to the bottom, and one to 25 fathoms, were cooled to as low a temperature as possible. The coldest temperature registered was $32^{\circ}2$ at 50 fathoms; at 150 fathoms the maximum index rose from $35^{\circ}5$ to 36° ; but as four thermometers, which must have passed through this warm stratum, if it existed, in descending to greater depths, did not register it, the reading has been rejected. At 200 fathoms there was a decided rise in the temperature, three thermometers registering from 35° to $35^{\circ}5$; the thermometer lowered to 300 fathoms also showed that it had passed through this stratum, but it did not necessarily denote that the warm water continued to the depth to which the instrument itself descended.

As a further indication of the existence of the warm underlying stratum, it is noticeable that none of the fourteen thermometers sent down to 100 fathoms, indicated a rise in temperature, but that the five which went below that depth each registered a higher maximum than when they left the vessel. The bottom temperature could not have been colder than $31^{\circ}3$. The thermometers used between 25 and 50 fathoms, which registered below 32° , were shaken in consequence of the line having accidentally got under the ship's bottom; the reading therefore was rejected.

This was the first time the underlying warm stratum was noticed, and it was then supposed to be doubtful. The remark in Captain Nares's journal, written at the time, is: "The rise in temperature at 200 and 300 fathoms may be due to the thermometers taking the temperature of the air after the register was set and

before entering the water; but as every possible care was taken to prevent this, I am not yet certain that it is not a correct register of the temperature at that depth."

On the 3rd of March, in latitude $53^{\circ}55'$ the temperature of the air was $37^{\circ}8$, that of the sea surface $37^{\circ}2$. No icebergs were in sight, but some were seen the day before, and one on the morning of the 4th was the last sighted. Serial temperature observations were taken from the surface to 500 fathoms. The water cooled to $32^{\circ}5$, at a depth of 80 fathoms, but between that depth and 500 fathoms it was certainly no colder; and when comparing this observation with those taken previously in higher southern latitudes, a certainty was felt that below 100 fathoms there was a warmer stratum of water, extending probably to a considerable depth. The maximum indices of the thermometers having passed through the surface water at $37^{\circ}2$, and the minimum through water at $32^{\circ}5$, they were unable to register any temperatures between those degrees.

The bottom temperature at 1950 fathoms could not have been colder than $31^{\circ}1$; and as each of the two thermometers sent down registered a colder temperature than that of any of the water they passed through near the surface, the reading may be taken as the correct temperature at that depth.

J. E. DAVIS.

GREAT TIBET.

DISCOVERY OF LAKE TENGRINOR.

THE progress of geographical discovery in Great Tibet is very slow. Only three Englishmen have ever crossed the frontier, and of these only one has given the results of his travels to the world. Mr. Bogle, who was sent on a mission to Tibet, in 1774, by Warren Hastings, wrote careful reports and took notes of all he saw and heard, but his manuscripts have been unused during the last century. They are now, however, about to be utilized. Captain Turner, employed on a second mission, followed in Bogle's footsteps about ten years afterwards, and his interesting narrative was published in the first year of the present century. Lastly, a Mr. Manning, formerly a mathematical tutor at Cambridge and the friend of Charles Lambe, succeeded in reaching Lhasá in 1812; but there is no record of his travels, and his journal, if he wrote one, has not yet been discovered.

The labours of the native explorers despatched, within the last ten years, by Major Montgomerie, have borne more fruit. In 1865 the Pundit made a journey from Nepal to Lhasá, and from Lhasá, through the upper valley of the Brahmaputra, to the source of that river near the Mánarowar Lake. An abstract of his journeys, with a route map, was published in 1867. We have recently noticed the important journey of a second geographical explorer who went by Sikkim to Shigatze in Tibet, and returned through Nepal. His routes are shown on the map of the region between India and Tibet in the *Moral and Material Progress Report for 1872-73*. But by far the most valuable addition to our knowledge of Tibet has been made by a semi-Tibetan, a young man who had been thoroughly trained to the work by Major Montgomerie, and who was despatched, in 1872, to explore some portion of the unknown region north of the

Tibetan watershed of the Upper Brahmaputra. He has crossed the great range forming the northern boundary of the Brahmaputra Valley, has discovered and marched completely round the Tengri-nor or Namcho Lake (which has hitherto been placed on our maps merely on the authority of old Chinese surveys of unknown authorship), and he returned by way of Lhása.

This is one of the most important geographical discoveries that has been made for many years, and the account of the young explorer's journey is extremely interesting. He set out with four assistants, and the party reached Shigatze on the 24th of November. They remained twelve days to purchase fifty sheep, the only animals likely to stand the journey over the stony mountain roads, and all the baggage was put on their backs. Leaving Shigatze on the 6th of December, the explorers crossed the Brahmaputra, and followed a regular route to the Tengri-nor, which is frequented by pilgrims, and by traders in salt and borax. The Brahmaputra, at the point where they crossed it on rafts, in the character of pilgrims, was 11,200 feet above the sea; and thence the route led them up the course of its tributary, the Shiang-chu, until they reached the Khalamba-La Pass at a height of 17,200 feet above the sea. This pass leads across the great range of snowy mountains which separates the valley of the Brahmaputra from that of the Tengri-nor, which forms a great inland system on a plateau 15,500 feet above the sea.

The streams were, for the most part, hard frozen, and the explorer was much struck by the number of hot springs that he met with, having temperatures varying from 130° to 180° Fahrenheit, the water generally having a sulphurous smell, and in many cases being ejected with great noise and violence, like the Geysers of Iceland.

The great lake, known to us as Tengri-nor, is called, on the spot, the Namcho or "Sky Lake," from its great altitude, and it proved to be a splendid sheet of water about 50 miles in length by from 16 to 25 in breadth. To the south it is bounded by a range of snowy peaks, flanked with large glaciers, and culminating in the magnificent peak "Jáng Ninjinthanglá," which is probably more than 25,000 feet above the sea. The range was traced for more than 150 miles, running in a north-easterly direction. To the north of the lake the mountains are not so high.

The Namcho Lake is considered sacred, and, although at such a very great distance from inhabited districts, and so high above the sea, there are several permanent Buddhist monasteries on its banks, and on islands, which are visited by large numbers of pilgrims.

The journey round the lake is of such great geographical importance that we give the whole narrative, as it has been drawn up, from the mouth of the explorer, by Major Montgomerie:—

"The lake is a magnificent sheet of water, and near Dorkiá it has the advantage of having an island close at hand which sets off the scenery. The island is about a mile long, and half a mile in breadth; it has a hill about 400 feet high in the centre, which is crowned by a temple of the goddess 'Dorje Phámo.' The explorer determined to make a complete survey of the lake, and he consequently deposited his property in the monastery with three of his men, being afraid of robbers; having done this he started off

with three other of his men. On the 24th of January they reached Ringa Do on the margin of the lake; here there is another island, called 'Kuhi Ne Dobo,' close to the shore, which is about 1½ mile in length, by about 1 mile in breadth.

"On the 25th they reached Jádor Gonpa (monastery); here they saw three pyramids or cones of earth or sun-dried mud, each about 500 feet in circumference, rising to a considerable height. The explorer went under these mounds by an artificial passage, and found that one of them was open in the centre. The people say that they were originally all closed, and that when a certain very devout Láma, who used to worship under one of these mounds, died, he was taken up into heaven through the opening. The Jádor Gonpa has about 50 Lámas. Near the monastery there are a great many fossil stones which are held in veneration; they are called 'Naidhowa.' The explorer saw a gigantic doorway cut in the rock through which the Lámas say the god 'Ninjinthanglá' passes; its height is about 25 feet. Owing to heavy snow the explorer was detained two days at 'Jádor.'

"On the 29th they reached Nángbá Do, which is also on the shore of the lake close to some small hills which are considered to be sacred. The next day they halted at 'Lángdang'; here they found the 'Shukpá' bush very abundant. On a low hill there is a temple of a god called Chogo Lá. On the 30th they got to Dakmar, and passing Thuígo Sumna shrine, they reached Nai Chu Sumna on the 31st. On their way they crossed the Nai Chu, which is a very large stream, being the largest that flows into the lake; it comes from the east. At the time the explorer crossed it was 40 paces in width, and completely frozen over.

"On the 1st of February the explorer reached the Tashí Doche Gonpa, a monastery, which is on a low hill near the lake; it has thirty-five Láma monks. To the south-west of this monastery there are a number of magnificent snowy peaks which are called the 'Ninjinthanglá' peaks. The Lámas say the highest peak is a god, and that he is surrounded by 360 smaller snowy peaks which act as his servants.

"To the east of 'Tashí Doche' there is another mass of high peaks called Nuchin Gásá, which appeared to the explorer to rise higher above the Namcho Lake than the Kailás peak does above the Mánсарowar Lake. The whole of these peaks were very imposing as seen from the monastery, which also commands a full view of the whole of the lake. Though the water of the lake is so salt as to be unfit for drinking it is nevertheless quite frozen over in November, the lake being about 15,500 feet above the sea. When the explorer saw it the surface looked as if it was made of glass; it is said to remain in that state till May when the ice breaks up with great noise. The lake contains fish, and quantities of small shells are found on the banks. The lake itself is a great resort for pilgrims.

"On the 3rd they halted near a small river; on the 4th they reached an open plain at night, and were put to great straits owing to a heavy fall of snow. They had left their tent behind at Dorkiá, and no shelter being available they had to clear off the snow and lie on the ground without any fire; they thought the cold would have killed them, but they managed to survive the night through. In the morning they found they

were well covered with fresh snow. On the 5th they went on to the Gháiká Chu River; it was snowing all the time, and they were forced to camp out again without any fuel or covering, and passed another very miserable night. On the 6th they saw the sun again, and were able to get some fuel and to make themselves tolerably comfortable; but whilst crossing at the side of the lake near a small stream (the Simjam Chu), one of the men fell through the ice, which was covered with snow, and would have been drowned had he not got hold of another man, who pulled him out again. The man's clothes froze hard directly he got out, and he was only brought round by means of a fire, which they at once lighted.

"On the 7th February they reached the Dorkiá monastery, from which they originally started, having been fifteen days in making the circuit of the lake. They halted three days at the monastery, and started off on the 11th, getting that day as far as 'Ringa Do.' On the 13th, they reached the Jádor Gonpa before mentioned, and, on the 14th, Nángbá Do. Here the explorer heard there was a lake called Bul Cho, about 6 or 7 miles to the north; he accordingly climbed a peak in that direction, and saw the lake; he estimated it to be about 6 miles by 5. A kind of borax is found by and in the lake; it is called 'Bul,' and hence the name. This borax is used by the inhabitants of Lhásá and Shigatze as a spice for meat, for tea, and for washing clothes, bathing, &c. It is carried away by the traders in great quantities.

"On the 15th they reached Lángdang; on the 16th, Dakmar; on the 17th, the plain of Cháng Pháng Chujá, where there are several hot springs, in which the thermometer rose to 130°. On the 18th, as they were about to start, some sixty armed men arrived on horseback, and began plundering their property, and, in spite of their entreaties, took away everything except the instruments, which they said they did not care to keep in case the authorities should find them on them, and ask how they came into their possession. After a great deal of begging, the robbers gave them back a piece of cloth each, with two sheep and two bags of food, a cooking vessel, and a wooden cup to each man; with these they had to be contented, the robbers saying if they troubled them any more they would kill them.

"The explorer had intended to make his way from the Namcho Lake to the north as far as the city of 'Sinning,' but after the robbery there was no possibility of doing that; and indeed, they were so far from habitations that it was a question whether they could exist, and there was nothing for it but to march as quickly as they could to the south in the direction of Lhásá where they were likely to get into inhabited ground soonest. The day after the robbery they halted in order to consult as to the best course to follow. On the 20th of February they went as far as the banks of the 'Nai Chu' River; here one of the men got sick, and they were obliged to remain there all the 21st. Their food consisted of one pound of flour and hot water. They had, moreover, nothing to cover themselves with, the robbers having taken the tent, and were exposed to the snow and wind, which blew very hard.

"On the 22nd they reached Dam Niárgan Lá. The explorer says that he had got so weak that he took much shorter paces than he had hitherto done. On

the 23rd they ascended the Dam Niárgan Lá Pass. After crossing, they decided to kill one of their two sheep, as they had exhausted all their flour; at the same time, seeing tents in the neighbourhood, all the men went out to beg, and after a long round came back with six pounds of flour, and began to feel more hopeful. On the 25th another man got ill, and they were obliged to halt again.

"From Dam Niárgan there is said to be a road to Lob Nor, and to 'Jilling' or 'Sinning.' From 'Dam Niárgan' it is about ten days' journey to Nákchukhá, a place that has a bad reputation as to the number of robbers who prey upon travellers; from thence it is about forty-five days' journey to Sokpohuil, which is quite a barren country, infested, however, by robbers. After passing Sokpohuil the inhabitants are more civilized, and are said to be very kind to travellers.

"The Lob Nor (? Kokonor) Lake is in the Sokpohuil territory, and close to it is the town of Kharká. It is about fifteen days' journey from Sokpohuil to 'Sinning' city, where a Chinese Amba, a man of considerable authority, resides. 'Sinning' is described as being very superior to 'Lhásá': good horses, sheep, &c., are procurable, and the shops are well supplied with silk, woollen articles, carpets, &c.

"On the 26th they halted under the Cháná Lá Pass. The country up to this point was called 'Dam Niárgan.' On the 27th they halted at Angchusa, where they noticed six Dogpá tents. On the 28th they reached 'Láchu Sumna,' the extremity of the 'Bádám' district, which begins at Cháná Lá.

"The 'Urirong' district extends from 'Láchu Sumna' to 'Dhog Lá.' On the 29th they reached Siwalungi Ritu (Gonpa) monastery, which has some 60 Láma monks. Here the height was observed by boiling-point; but owing to the loss of his quicksilver, when robbed at Cháng Pháng, the explorer was unable to take latitude observations. He, however, hoped that on reaching Lhásá he would be able to borrow sufficient money to enable him to refit and to return to this same place on his way north-east to China.

"On the 1st of March he crossed the Dhok Lá Pass encamping on the other side. The district of 'Jáng Tálung' extends from the Dhog Lá to the Chak Lá Pass. On the 2nd they reached the very large monastery called 'Jáng Tálung,' which has two head Lámás with about a thousand monks. Here they halted during the 3rd in order to rest and examine the monastery. Inside they found a large number of images carved in the walls, the whole of which were adorned with gold. The road from Lhásá to Lob Nor (?) and 'Jilling' ('Sinning') passes about 1 mile south of the monastery. The Sinning Kafilas pass by this route with their camels laden with merchandize. On the 4th of March he crossed the Chak Lá Pass and encamped at its foot on the opposite (south) side near the village of 'Lángmo,' where they saw the first signs of cultivation that they had met with since the 29th of December. On the 5th they reached 'Jhokár Churtan;' on the 6th Naimár village, which has about twenty houses, surrounded by a number of smaller clusters of huts. On the 7th they reached the monastery of 'Nehlin Dák;' on the 8th, after crossing the Phembu Gong Lá Pass, they halted at Lingbu Jong. The Phembu district ceases at the pass of that name. On the 9th of March the party reached Lhásá. They were excessively glad to get back to a civilized

place again, where they would at any rate have no chance of being starved, as they were at one time likely to be.

"Though the Lhasá people were hospitable enough, the explorer found there was no chance of his being able to borrow sufficient money to enable him to march to 'Sinning,' as he had intended. With the greatest difficulty he managed to borrow 150 rupees from a trader who was going to Gartok; but he insisted upon the explorer accompanying him, and, in addition, took his aneroid barometer and compass as a pledge for the money. The aneroid, which was a large one, he apparently took for a magnificent watch, and at the end of the journey the explorer's messenger, who was sent with money to redeem the instruments, had some difficulty in recovering them. Having the command of so little money, the explorer decided upon returning to India, and after a long and difficult journey, reached the head-quarters of the Great Trigonometrical Survey in safety."

His route survey extends over 320 miles of a hitherto entirely unknown country. Latitude observations were taken at intervals, and observations for the height above the sea, by boiling-point and aneroid, at twenty-four places. The geography of an area of 12,000 square miles has been elucidated, and one northern tributary of the Upper Brahmaputra has been thoroughly explored, thus indicating the position of the northern watershed of that great river. But the chief discovery has been the position, size, and elevation of the Tengri-nor Lake, and the character of the internal system of Tibetan drainage.

THE NICOBAR ISLANDS.

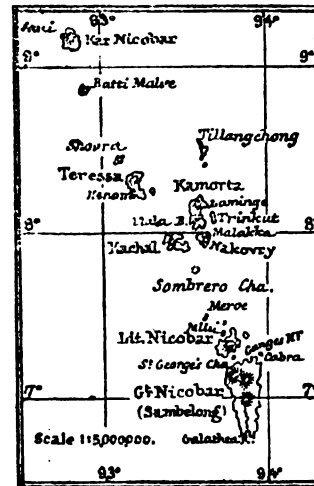
THE last addition to the great Indian empire may not be well known, and the following few lines on the subject may therefore be interesting to the general public. The Nicobar group consists of eight larger islands and some smaller ones. They lie in a line from S.S.E. to N.N.W. in the bay of Bengal, and form the link between the Andamans and the Malay Archipelago. The islands lie between $9^{\circ} 15' N.$ and $7^{\circ} 45' N.$, and from $93^{\circ} E.$ (of Greenwich) to $93^{\circ} 57' E.$ It will thus be seen that the climate is tropical. The temperature is very uniform, and averages 28° centigrade. The rainfall is above 100 inches, and is at times, sometimes for months, very heavy, but it varies very much in the different years.

The islands are divided by their natural formation into two different groups which meet in the centre. Over the whole length of the islands volcanic action has left its trace as they are formed by later or newer upheavals. The washing down of the soil from the hills has formed swampy plains here and there. On this alluvium mangrove grows nearest the sea, and on the land raised over high-water mark you will find pandanus groves. More or less round the whole of the islands the sea has formed a coralline alluvium and the fringing reefs of coral stretch far out into the sea.

Great Nicobar, Little Nicobar, and Katchall are brown coral formation, and the other islands are of volcanic origin and are covered with a peculiar substance—polycistine clay—that must have formed deep down under the sea where the water was quite still. It is full of minute shells and contains proofs of its origin.

When digging a well the present writer came on shark's teeth and whale bones in the clay $28\frac{1}{2}$ feet under the surface of a hill.

The brown coral formation, as Rink calls it, and the other which I have just mentioned, meet near Nancowry Harbour, for Katchall belongs to the southern group, while the other three islands round the harbour are as different from it as possible. The islands, consisting of clay on volcanic rock, are covered with high grass, which is fringed towards the sea with jungle, whereas Katchall and the Southern Islands are all clothed with jungle down to the very edge of the sea.



On the coralline alluvium, before mentioned, grow the cocoa-nut trees, the great wealth of the islanders, and near these the natives have built their villages. The interior of each of the southern islands is still a *terra incognita*. It is not on record that a single European has penetrated into them. The jungle is high and difficult to get through, interwoven with rattans and thorny creepers, and, though magnificent to look at, it is very unhealthy. Into it no ray of light penetrates through the massive foliage of the giant trees, and without light no flowers thrive.

In 1869 the Indian Government took possession of these islands, and affiliated the new settlement to the great penal colony at Port Blair. A detachment of Madras sepoy, two hundred convicts, and building materials were sent to Nancowry Harbour. Now, in 1874, the settlement presents a very nice appearance. It lies on the northern side of the harbour, scattered on undulating grass-land. There are two wooden barracks for the convicts and a hospital; also a barrack for the sepoy, a corrugated godown for the commissariat stores, and houses for the officers and subordinates. The jungle has been cleared in the vicinity, and cotton plantations have been formed. The useless and unwholesome lalang grass has been ploughed up, and vegetable-gardens made, and roses planted. The swamps (fresh water alluvium) near the settlement have been cleared of mangrove, drained and banded and planted with cocoa-nut trees. Cocoa-nuts are collected from the natives, and the young settlement supplies its sister colony with oil. One of the reasons why the present undertaking has been so much more successful than the former attempts, which I will refer

to presently, is that good houses and good food were supplied to the colonists. Being able to draw on Port Blair, where a similar undertaking is in a much more advanced stage, the colony has been kept supplied with all it needed. The cocoa-nuts used in the settlement are procured from the natives of the islands. These are not very numerous, and live as did the primeval lake-dwellers of Switzerland. They are big, strong people, with flat heads, and slightly protruding jaws. A full-grown man stands between 5 feet 6 inches and 5 feet 9 inches in height. They are quite distinct from the Malays and Burmese, and I believe that *they are related to the hill tribes in Formosa*. They have their villages on the coral sand inside the fringing coral reefs. The passages through the reefs are marked with some sign-posts. The houses are raised on posts, and are circular, covered with a dome-shaped roof. The tide rises under them and washes away the household refuse. Their huts are scrupulously clean, and are very well built. In one house you will generally find several families living, mostly relatives. The persons living in one hut form in a wider sense one household, and the work is divided among all. The floor of the house is planked, and along the side walls lie a few boxes and the beds, consisting of mats and little pieces of wood for head-pillows. On the walls are fastened their spears, oars, and row upon row of pigs' jawbones, symmetrically arranged, as well as spoons and other treasures. The entrance to a Nicobar house is through a hole in the floor immediately opposite the cooking-place. Here the old women of the house live, and the place is quite as neat as everything else about them. On the fire are several big pots, in which are boiled pandanus bread. This, together with fish, forms their staple food. The process of making the *Jarome* (pandanus bread) is very tedious and troublesome, and is undertaken by the women. A couple of feet under the floor of the hut are suspended cages for fowls and pigs, and these also belong to the women. The Nicobar women are very ugly, and wear their hair short cut; their clothing consists of a little blue skirt a couple of feet long. The men wear long hair, and their only dress is a strip of cloth tied round their waists and passed between their legs. This strip of cloth hangs down like a tail from behind. This was also the custom in 1647, for Keoping, a Swede, who anchored off the islands in that year, relates that he saw people there with cats' tails. Linnæus believed the tale. At a distance it looks not unlike a tail.

The Nicobarians are very superstitious, and fill their houses with all sorts of figures and carvings. Some of these are tablets representing the sun and the moon looking down upon the world, where the birds of the air are seen over the huts of men, wherein the inhabitants are dancing: on the earth are pigs and poultry, and in the sea the fishes are represented in a dance. I sent a very curious tablet of this sort to the Congress of Stockholm this year. The sun and the moon are the great powers in their superstitions, and their priests sacrifice to them. The priests are a separate caste, their pretended powers descending from father to son. They pretend that they can see spirits, and spirits are very much feared, especially the *manes*. If it is supposed that a spirit is playing tricks in a village, an imitation canoe is built, and after sacrificing every kind of thing in the house,

which are all broken and thrown down under the house with much crying and howling, the priests prepare to rid the village of the spirit. After a fight, he is conquered and brought out to sea in the imitation boat, towed by another canoe. At a goodly distance the boat with its weird freight is let loose, and with it is supposed to depart the troublesome spirit. Wherever the boat lands, there the spirit takes up his abode, and then there is enmity between the spirit-sending and spirit-receiving villages. Generally a fight ensues.

These village fights are not often fatal. The combatants array themselves in well-padded hats, and their weapons consist of long sticks steeped in pigs' blood, and rolled in sand. The things are always kept ready in every village. When a fight is resolved on, the offended village calls on friends and relatives and prepares to settle the quarrel. Their canoes are very well built—of one hollowed log, with little sticks across, a projecting bow, and an outrigger on the right side. A couple of big canoes of this description, manned with young people provided with fighting-sticks, glide noiselessly on a dark night under the village which is to be punished. A dreadful shriek is raised, and the men, awoken from their sleep, rush down to meet the enemy. On account of the length of the weapons, the combatants proceed to an open place, and a fair fight ensues. The head is well preserved under the padded hat, and a few bruises are the only visible results of the fight. When the fight has lasted a long time, and the men of the village are getting the worst of it—being fewer in number—the women rush down with sword blades in their hands and separate the combatants. The quarrel is then made up, and ends in a feast that sometimes lasts for a long time, and usually terminates in a general scene of drunkenness. The canoes at the Nicobars are all alike, and are very well built: they only vary in size. Every evening, when the tide suits, you will see lights around the coasts: this is the men out fishing. There are generally two men in each canoe; the one paddles noiselessly forward, while the other stands in the bow of the canoe. In the left hand he holds a torch, formed ingeniously of a single dry cocoa-nut-leaf, and in the right he holds a spear. At low tides the women search the reefs for shellfish. They do not eat trepang.

When a man dies, his relatives assemble and clothe him nicely, and he is buried behind the village, with wailing. His boxes are then opened, his house is rummaged, and all that belonged to him is brought outside and destroyed.

It is not considered loyal to take any inheritance from relatives, except such things as boats, trees, and houses. Sometimes even boats are broken up. The spears are splintered, and all that belonged to the deceased is arranged in a sort of monument over his grave.

All blood relatives, even distant ones, keep up mourning for two months. This consists in abstinence from all sorts of amusements. No dancing or singing is allowed in the dead man's village; no pigs are killed, no liquor is touched, and the nearest relatives even abstain from tobacco. This is no little sacrifice of comfort on their part. When the two months are over, the mourners collect at

the grave and dig it up again. The nearest relative, wife or mother, seizes the dead body's head and tears whatever flesh or foreign matter there may be off the skull. The body is then again given over to mother-earth, but often the memory of the defunct dwells among them for many years. Many among these people are musical, and sing rather pleasingly. They make musical instruments of hollow bamboos, and accompany themselves. Their dance is a round dance, which is performed inside the cupola-formed houses. They lay their arms across each others' backs, with their hands resting on the next man's opposite shoulder, and then form a circle. One man leads, and to a monotonous tune they step out, sometimes to the left, sometimes to the right, the leader giving the direction, occasionally landing on both heels. They are, on the whole, a very amiable people. Theft is nearly unknown, and yet everything has owners. To an occasional visitor they might appear the idlest people he had ever seen, but they are not so. They are industrious, and what they do is well executed. They make neat little gardens in the middle of the forest, they build their canoes and houses very nicely, and there is much more finish about their work than is the case with most Indian produce, but they are slow workers. They esteem their women highly, and are very jealous of them. This forms one of the great and good qualities of my Nicobar friends. In the East a woman is generally a slave and a chattel, but not so at the Nicobars. A Nicobarian looks up to his mother, wife, and sister.

Only few vestiges survive of what may have been a religion once. To the sun and the moon they attribute mystical powers. They believe in a life after death, and are very much afraid of the dead. Their priests are very clever jugglers, and practice a little ventriloquism.

As the climate is debilitating, they feel a craving for stimulants. They munch betel-leaf, betel-nut, and quicklime together. The juice forms a black cover round their teeth, which sometimes increases to an enormous size, and gives their faces a horrible and ghastly appearance. Their lips never meet after boyhood, and kissing is unknown. They make toddy from the juice of the cocoa-nut tree, which they drink if they can get no arrack or rum. They are very immoderate with liquor, and it is common to find a whole village drunk. These people, though they have many good qualities, and are very able, are dying out fast, and my belief is that the arrack kills them off. The horrible arrack is brought to them from the Straits, and is bartered for cocoa-nuts. In comparison with the number of inhabitants a very brisk trade is being carried on. Before the Indian Government took possession of the islands rumours of murders and scuttling of ships were every now and then heard, and no doubt there was some truth in them; but the other side of the tale has not been told—of what injury was inflicted, and insults offered, before the Nicobarians retaliated. From what I have seen of the people, I believe that in every single instance they were provoked. The Danes tried to stop these irregularities, but they were never successful when colonizing.

The Nicobarians are great linguists: the old men talk Portuguese, middle-aged men English, young men Burmese, boys Hindostani, and all speak Malay. This shows in whose hands the trade has been for the last sixty years, and how it has changed. The

Nicobarian language is spoken in different dialects. It is very guttural and difficult to speak. It is easy in construction, but does not resemble any of the surrounding languages. Of course some words are adopted, namely, of things that have been newly introduced; but, on the whole, it is a language very free from foreign elements.

In the interior of Great and Little Nicobars an inland tribe is said to live, which I believe is the same as the Chowra men. This tribe would appear to have been on the islands before the more numerous people came there. They are called the Shobaeng, and are, *I believe*, of Mongolian origin, and speak a different language. On this point I speak with a little reserve, for no European has as yet seen them in their homes, and what I know about them I learned from a young man who visited me, and who, the Nicobarians said, was of the inland tribe. He had been caught as a boy, and was certainly different from the people he was now living with. He was of Mongolian origin.

There are other reasons why I do not believe, as others do, that the Shobaengs are negritos. If I am right, then they have been driven away from the fertile alluvium on which the cocoa-nut trees grow. They are now only found on the little island of Showra, where they subsist as the potters of all the islands. At the Great Nicobar and Little Nicobar they must lead a wretched and very primitive life, being shut out from the coast and all communication with human beings.

In 1711, two Jesuit fathers went to the islands to convert the people. They were killed after a 2½ years' stay, and the only records left are a few letters from them.

In 1754 the first Danish settlement was made. Arms and soldiers were plentiful, but good food and shelter was not provided, and, after lingering for a couple of years, fever, drunkenness, bad officers, and a quarrel with the Nicobarians, ended this attempt at colonization.

In 1768 the Moravian Brethren commenced a mission to the islands. They were supported by the Danish Government, but only very slightly, and had to work hard to subsist. They suffered very much from fever and bad supplies, and after many of them had died, the mission was given up in 1787. The Moravians died so fast that they had not time to learn the language, and they did not succeed in converting the natives. During the time of the Moravian mission the Austrian frigate 'Joseph and Maria Theresa' came to Nancowry, and took possession of the place, but the colony that was commenced ended in great misery, and the missionaries had to forward the remnant to Tranquebar.

From 1787 to 1807 a guard was kept up by Denmark to secure possession.

From 1807 to 1814 England took possession, being then at war with Denmark.

In 1814 the islands were again given up to Denmark; but it was not until August 1831 that the next colonization was attempted.

The gentleman to whom it had this time been entrusted was the Rev. Mr. Rosen, a Danish Lutheran minister. He was practical and enthusiastic, and worked very hard. He had many reverses and misfortunes, suffered from fever, had at times bad food, and would no doubt have succeeded in carrying out his plans, had

the officers at Tranquebar been as persevering as Mr. Rosen. He was recalled in November 1834, and the settlement lingered on till 1837. In 1845 Denmark again made an attempt at colonizing the islands, but the matter was not put into the right hands, and it resulted in a total failure. The 'Galatea,' on her voyage round the world, started the undertaking, and left some of her officers there, but all the expenditure of lives and money was wasted. It was with the 'Galatea,' that Dr. Rink came to the islands, who has given a very well-written short description of its geology. This is the same learned Dane who has collected the folklore of Greenland.

In 1848 Denmark took her flag away, and from that time till 1869 the Nicobars had no European master. This brings us down to the present settlement. In an enterprise like the colonization of the Nicobars it is always a serious consideration whether it is likely to turn out a success. Any new arrival is almost sure to get a dangerous and obstinate jungle fever, which has had many victims in days gone by. The fate of all those who have hitherto attempted to colonize has been misery and despair, and previous settlements have invariably been abandoned. This is very true of the past, but I do not think that it is any reason why the present colony should not succeed. All previous attempts have been made without the necessary stores, without good houses, with a limited number of men, and with slow and uncertain communication with the base of operations. In the first years of the Andaman settlement the death-rate was very great; now Port Blair is a sanitarium. So will it also be at the Nicobars, when the proper drainage is completed, when the land all round the settlement is tilled, and the swamps are banded.

The communication is now regular by steamers, the stores are supplied by Government, and are of the best sort procurable.

If once Government succeeds in making its little penal settlement healthy, settlers from Penang will not be wanting, and the place will soon thrive, for it lies on the highway of all the trade of the Bay of Bengal. In this bay terrible hurricanes often meet the ships, and there is no harbour which could offer a better shelter than Nancowry. It is sheltered from all winds, and can be entered from the west or east. It could easily be provided with docks, as there are deep and sheltered bays. The cocoa-nuts, which abound, would offer the settlers something profitable to commence with, but the best profits would be from growing cotton and spices. The edible birds'-nests, which the Chinamen prize highly, would at once bring in a little revenue, and the guano in the subterranean caves at Katchall would be valuable for manure. There is not enough for exportation, but it would be useful for local purposes. The cotton grown at the Nicobars has been reported upon, and it appears that it is better than any Indian cotton. Every fruit planted there has succeeded well, and we know from the Danish settlements that spices thrive well. Hill-paddy gave a very good crop in 1872, when it was experimentally grown. Building materials are plentiful, and I think it is only a question of time when the Nicobars will become a flourishing colony, and, though one of the latest, perhaps not the least jewel in Her Majesty's crown.

FR. AD. DE RÖEPSTORFF.

AMSTERDAM ISLAND.

THE following account of the little known Amsterdam Island, was written after the visit of H.M.S. 'Pearl,' bearing the broad pennant of Commodore Goodenough.* The Islands of St. Paul and Amsterdam, in the Indian Ocean, are nearly on the same meridian, and about 60 miles apart, Amsterdam being the most northerly. In August 1873 the Commodore and Mr. Elwyn, a sub-lieutenant, landed, at about 9 o'clock, to leeward of a patch of kelp, and at a spot where a fault in the horizontal layers of basalt, and a consequent break up of the rock, had caused a slope of well-rounded blocks of old lava to give an easy ascent. They scrambled on shore and up the cliff. The following is an account of what they found:—"The first thing which met our eye was to our surprise a cabbage-garden. Thickly planted cabbages were standing in a deep, rich mould, thoroughly sheltered from all the easterly winds. Some plants were over 2 feet 6 inches high, and had the seed stalks of last season upon them. They could not have been cut for at least a year—possibly not for two years; and if the deserted look of the land had not already shown that there was no longer any person on shore, the state of the cabbage-garden would have been enough to prove it. But towards the upper part we soon came upon the recent tracks of a cow or bull, and here was proof of continued residence on the island. The track could not have been more than ten days, possibly not more than three days old.

"Leaving the patch of cabbages, we went towards the hut, which was about three quarters of a mile to the northward, walking near the top of the cliff to gain the more level ground. The long, coarse grass was growing in thick tussocks, making a thick matting, and fatiguing walking; and the greater part of our way the tussocks grew out from the intervals and crevices of rough scoria, which here and there formed black, rough ridges. But occasionally we crossed a hard, bare piece of old lava, still showing in its semicircular wavy ridges, like those on a drying stream of pitch, the precise form in which it cooled after an eruption from one of the many little craters standing near, some hundreds of years ago.

"At about a quarter of a mile from the cabbage-bed we found a little, level, cleared space, as if for a hut. Pieces of a white plate with a blue edge lay near it, and some bones, which Dr. Messer tells me are those of a sheep or goat, lay together not far off, much weathered by wind and sun and rain, and already some years on the ground. Some bits of tufa, suitable for building, were in a little heap on one side, away from the sea; and towards the sea, on a couple of horizontal poles, lay some dry grass, as if prepared for thatching. Mr. Elwyn thought it might be a grave, but on lifting the grass the bare ground showed beneath. It was certainly something like a *mouri* of the South Sea Islands.

"Another walk of half a mile brought us in sight of the hut. We sprang forward, thinking that perhaps a skeleton, if not of a man, yet of some of the cattle, might be within. There was no sign of life about it. A trestle-bed stood behind the framework of a partition at each end. Some feather-bedding, rolled up and tied with string, was in a corner, with a couple of old broken and mended easy-chairs. A deal box

* See our number for February 1874, p. 474.

full of gear lay on the ground to the left, and a trunk rested on the bed to the right. After a glance round, Mr. Elwyn began to turn over the gear to the left, and I opened the trunk to the right.

"The hut was about 30 feet by 14 or 15. A wall, about 4 ft. 3 high, of lumps of tufa, cemented with a sort of pozzuolana earth; a well-thatched roof of rafters of rough wood from the trees in the neighbourhood covered it; at the south end, and against the slope of the hill, was a semicircular pen, which might have been for a pig or two. Rough steps were cut into it. A semicircular wall to the east enclosed a place for fire. A large scuttle-butt, to which there was a well-worn path, stood 40 yards N.E., and to the N.W. a flag-staff was planted in a heap of scoria. Empty barricoes, an old pigeon-house, and sundry odds and ends, were strewn in front of the house, which faced the east.

"The only piece of decidedly ship's timber that we could see was a piece of a studding-sail boom or mast, which supported the ridge pole of the roof at the north end.

"The contents of the box on my side were soon examined. They were a dozen volumes of educational books, all in French, and each with the name of Eugenie Clochard, or Melina Clochard, within the cover. On Mr. Elwyn's side, the strong deal box contained two or three large, round, white French dishes, white tureen or dish covers, the *Mysteries of Paris*, in the usual bright yellow paper cover, a manuscript diary in pencil, from December the 27th, 1870, to January the 19th, 1871, a receipt for 15 francs to one Jacques Bastide, and a manuscript list of names and residences, many of the names being native names of some southern country, possibly Madagascar, such names as Montoncala, Singaïny, Vaïtilingani, Tanacoudy, having a sound of Malagassy in them. There was also a book with a woman's name in the cover, and then *Ile de Maurice, partie pour Madagascar*.

"Mr. Elwyn also turned out a large round button of a woman's velvet jacket, some shreds of a woman's dress, and some gridirons and cooking-pots. A rusty old gun and stock, double-barrel and muzzle-loading, was found under the box—a French one by the swivel for a sling on under part of stock.

"At 20 or 30 yards from the hut, and to the west of it, a long, hollow rift in the rock formed a most convenient cave for shelter. It ran about N.N.E. and S.S.W. In places the rock formed a natural roof to it. At intervals it was open to the sky. The lower end to the N.N.E. was fenced off by a wattled fence of reeds, and within the fence a ledge had evidently been used as a bed-place. A quantity of dry grass was heaped up upon it. Near the mouth were bird's feathers, limpet shells, legs and claws of small crabs, hair of a goat or hairy sheep. From a passage in the diary, I think that the uncovered part of this hollow, which was about 15 feet wide on the floor, had been used as a garden. A thick bed of mould covered it and was well suited to it.

"Round the hut were many tracks of cattle and sheep or goats, but none of men. One foot-print of a calf or heifer looked quite recent, and, having looked carefully at these, we turned back to the cabbage-garden landing-place, taking a line rather higher up the hill, in order to gather some branches from the only trees

we could see growing, and which might have been 50 or 60 years old.

"We were at the boats in a short time, and on board the ship about four hours after leaving her. What conclusion was to be drawn from all that we had seen?"

"The notice for the 'Pearl's' visit to Amsterdam was the following:—

"Mr. F. R. Lee, R.A., in his packet the 'Linda,' left the Cape of Good Hope on about the 18th of October, 1872, and passed the island of Amsterdam. He found it impossible to effect a landing in consequence of the heavy surf, but while cruising close to the island, strange sounds were heard as if proceeding from a fog-horn or a speaking trumpet. It was Mr. Lee's opinion that there were people on the island, but all his efforts to discover them or bring them within observation, were without result."

"A paragraph, nearly in these words, appeared in the *Melbourne Argus*, and was copied into *Galignani's Messenger* of March 5th, 1873. Having been read by a Mr. J. Sohier, of Nantes, that gentleman thought that possibly some of the passengers, by the 'City of Sydney,' supposed to have been lost hereabouts—perhaps his own brother, a passenger by that vessel—might remain alive on the island, and he begged his London correspondent to appeal to the Admiralty, to allow a vessel to call and ascertain if any persons were living there.

"Who are the people who *have* lived there? The house is strongly and roundly built, with a good amount of labour; the cabbage-garden has been liberally planted, at a distance of a mile, by a rough road. Cattle, goats, and pigs have been carried there. All this must have been done by people in strength, and with plenty of food to keep it up. The diary is not that of a castaway, but of a voluntary resident, who had carried his seeds with him, and had time and strength to make a well.

"He was probably one of the party who have long worked the seal fishery of St. Paul's, and had probably come up to Amsterdam to found a branch establishment. The beds and gear were not left in a hurry or abandoned, but were made up by people who meant to return to them or to carry them away, and to judge from the state of the cabbages, they must have left more than a year ago. Some castaways *may* have occupied the hut for a time; and the girl's school-books, the list of names, the receipt, still more the fragments of women's clothing, would seem to show that this has been the case—but all must have left long ago."

Until this year it was believed that the Dutch navigator Vlaming discovered Amsterdam Island in 1606. But this year Lord Stanley of Alderley in his *First Voyage Round the World by Magellan*, edited by the Hakluyt Society, has fully established the fact that the Island of Amsterdam was discovered on March 18th, 1522, by the 'Victoria,' the first ship which ever sailed round the world. This is recorded in the *Derrotero* or log book of the voyage of Magellan by the pilot Francisco Albo (or Alvaro?) the original of which is preserved at Simancas. He says:—"On the 18th of March I took the sun in $49\frac{1}{2}^{\circ}$, it had $2^{\circ} 55'$ declination, the latitude came to $37^{\circ} 35'$, and whilst taking the sun we saw a very high island, and we went towards it to anchor, and we could not fetch it, and we struck the sails and lay to until next

day." He says the island is in 38° S., that it is uninhabited, and has a circumference of a matter of 6 leagues. The true latitude of Amsterdam Island is $37^{\circ} 52'$ S.

The Dutch navigator Vlaming sighted the island in 1696, and anchored, as he says, in 16 feet, on the south side, about a gun-shot from the shore. In Deutrecasteaux's voyage, quoting Vlaming, it is said that the seals were so numerous that he had to use the butt of his musket to keep them off. There are plates of Amsterdam and St. Paul Island in Valentyn's Dutch work on the East Indies, which have been reproduced in Lord Stanley of Alderley's *Voyage of Magellan*.

Rear-Admiral Burney says that Deutrecasteaux passed the island, in March 1792, and made sketches and a plan, which are very fairly accurate. He describes the island as being on fire, and supposes the grass and trees to have caught, and that there was no volcanic eruption. Even at that time he had heard that sealers were engaged in the fishery of this island and St. Paul's.

The next notice of it is to be found in an account of the settlement of New South Wales, by Colonel Collins, the Judge-Advocate General of the Colony. He says that, in January 1796, a storeship, the 'Ceres,' arrived. She had touched at Amsterdam, and had brought away two Frenchmen and two Englishmen, who had been left by a brig to carry on the fishery. The brig having been taken by the 'Lion,' an English ship, and carried to China, these men had remained for three years on the island, living for the last eighteen months on the flesh of the seals whose skins they cured. One of the Frenchmen, a M. Perron, is spoken of as a person of some education. He had kept a minute and well-written journal, and had made some sketches.

In October 1837, Captain Wickham, in H.M.S. 'Beagle,' determined the position of Amsterdam Island to be latitude $37^{\circ} 52'$ S., and longitude $77^{\circ} 36'$ E., within 4 miles of the position as given by Vlaming, and within 8 miles of that given by Magellan's pilot. The highest point is 2760 feet above the sea. In 1838 two of the South Sea sealing-vessels owned by Messrs. Enderby, the schooner 'Eliza Scott' commanded by Mr. J. Balleny, and the cutter 'Sabrina' Mr. H. Freeman, touched at Amsterdam Island.*

There are, no doubt, other accounts of visits to Amsterdam Island, although they are not to be found on board the 'Pearl.'

The parts of these accounts to be noticed are that Vlaming and Deutrecasteaux both speak of great quantities of seals, whereas the 'Pearl' saw none, though she ran half round the island, and on Deutrecasteaux's track, about half a mile off shore. Horsburg speaks of the island having been formerly covered with forest, which has been burnt down, and Deutrecasteaux speaks of brilliant vegetation on the south side, and a vast fire on the north. Horsburg's paragraph is evidently framed on these two statements, but I very strongly doubt the existence of forest. Alvaro, Magellan's pilot, distinctly says—"the island has no trees at all." The few trees seen from the 'Pearl' lay in sheltered hollows on the north-east side of the island, the parts not seen by Deutrecasteaux. The

bare, storm-driven mountain side on the north and southern slopes could not support a tree. Probably the conventional marks for trees given in a sketch by Valentyn, a companion of Vlaming, are the authority for Horsburg's mention of a forest. A very important and interesting fact in botanical geography has, however, been brought to light by this visit to Amsterdam Island. A shrub, called *Phyllica arborea*, was found growing, which had previously been supposed to be peculiar to Tristan d'Acunha in the Atlantic. The two isolated rocks are separated by the continent of Africa, as well as by the intervening ocean.

Deutrecasteaux's fires seemed also doubtful, but an entry in the diary *Le feu dans l'Erbes* suggests that in February, the southern August, the thick tussocky grass would die down. The damp remaining in it would be very likely, indeed, to cause spontaneous ignition, and a fire of grass would blaze and smoke vigorously for two or three days. Deutrecasteaux passed in March, the southern September, and the very time for such a fire to take place.

SOME UNSCIENTIFIC NOTES ON THE HISTORY OF PLANTS.

WHEN the writer of these lines was a cadet at Addiscombe there was in great favour one of those compositions which are apt to be so depressing to those who have left behind the cadet stage of existence, and which are known as comic songs. The humour of this one consisted in introducing obvious anachronisms, followed by a refrain to the effect:—"at least it would have been so—only it was not invented till after that." *E.g.* Guy Fawkes figured as crossing Westminster Bridge—"at least he would have done so—only it was not built till after that!"

This refrain was brought to mind by an interesting letter from Dr. Birdwood, which appeared some time ago in the *Athenæum* (Oct. 31st), on certain apparent representations of the custard-apple on the walls of the Ajanta caves, representations dating, according to the best authority (Mr. Fergusson), not later than the 7th or 8th century; whereas the *Annona squamosa*, or custard-apple, in the words of the refrain, "wasn't invented till after that;" being a native of the Antilles. The present writer, not having seen the drawings in question, ventures no suggestion on the subject, and the only contribution that he can make to the specific history of the custard-apple is to relate an Indian story or apologue, which he heard very long ago—though not indeed long enough ago to establish the existence of that fruit in India before the discovery of the Antilles.

Once upon a time it was announced that the Pádsháh was about to pass through a certain remote village of Upper India, and the village-heads gathered in pancháyat, to consider what offering they could present on such an unexampled occasion. Two products only of the village lands were deemed fit to serve as *nazrána*. One was the custard-apple; the other was the wood-apple (*Feronia elephantum*), a wild fruit with a very hard, shelly rind, something like a large lemon or small citron converted into wood. After many pros and cons, the custard-apple carried the day, and the village elders accordingly, when the king appeared, made *salám*, and presented a large basket of custard-apples. His majesty did not accept the

* See *Royal Geographical Society's Journal*, ix., p. 517. VOL. II,

offering graciously, but with much abusive language at being stopped to receive such trash, pelted the simpletons with their offering, till the whole basketful had been squashed upon their venerable heads. They retired, abashed indeed, but devoutly thanking heaven that the offering had not been of wood-apples!

Dr. Birdwood's remarks reminded me of certain passages in which the existence of another American fruit in the old world, long before the days of Columbus, is assumed to be recorded. I speak of the Pine-apple.

In Professor Rawlinson's *Ancient Monarchies* (vol. i., p. 578) it is stated in reference to ancient Assyria: "Fruits . . . were highly prized; among those of most repute were pomegranates, grapes, citrons, and apparently *pine-apples*." A footnote adds: "The representation is so exact that I can scarcely doubt the pine-apple being intended. Mr. Layard expresses himself on the point with some hesitation (*Nineveh and Babylon*, p. 338)."

The cut on the succeeding page is somewhat like a conventional representation of a pine-apple, though it seems to me by no means so exact as it does to Professor Rawlinson.

Again, in Mr. Winter Jones's translation of the *Travels of Nicolo Conti*, as printed in the Hakluyt Soc.'s volume *India in the XVIIth Century*, edited by my friend Mr. Major, the traveller (circa 1420-1430), speaking of a place called Panconia [in other readings Pauconia, Pancovia, Paconia], which seems to be, as the editor points out, Pegu (properly Bagó), tells us: "They have *pine-apples*, oranges, chestnuts, melons, but small and green, white sandal-wood, and camphor." As there is no *caveat* appended, I presume that the translator here intended what is meant by pine-apple in modern English, and which used to be in our youth, before the days of ocean steamers and penny slices, the symbol of Apician luxury in England, viz., the *Ananassa sativa*.

In both these cases, surely, there can be no doubt that the fruit intended, whatever it be, is not the *ananas*, "for this wasn't invented till after that," and it has, I believe, carried the American name, which we have just used, along with it round the world.

The term *pine-apple* was, indeed, good English long before the discovery of America, but it meant what is now called a *pine-cone*, and in Scotland a "fir-top." In a list of plants "*for an herbere*," quoted by Mr. Thomas Wright from a fifteenth century manuscript in the British Museum, we find among others "*date-trese (P), peche-trese, pyne-appulle*."* This is the only sense given of *Pine-apple* in *Minshew's Guide into Tongues*, 2nd ed., 1627. The name of *Pine* was given to the *ananas* by the Spanish discoverers, of course from its resemblance to the other natural production; but in the cone of the Italian stone-pine this resemblance is far closer than would be suggested by any English species, the cone of the stone-pine, besides its great size and solidity, having the same tendency to a cylindrical form which you see in the *ananas*. The resemblances and differences are detailed at length by Oviedo (see *Ramusio*, vol. iii., ed. of 1556, f. 135 v.)

I cannot suggest what the Assyrian figure was intended for; scarcely for a pine-cone. But Conti certainly intended pines in the ordinary sense. The words of Poggio's Latin are simply *pinus habent*.

* *History of Domestic Manners and Sentiments*, 1862, p. 301.

What were these pines? It is not certain that he meant a fruit at all, or he would probably have said *nuces pineas*, or the like; he may have meant trees only, as were the white sandal-wood trees (*Santalos albos*) of the same clause. Pine trees do grow in our province of Pegu, but only, I believe, in the hill-country near the Salwen. If a tree be meant, probably it was the *Casuarina muricata*, which is indigenous on the Burmese seaboard, which has a good deal the appearance of a species of pine, and which Mason says the natives call by the same name as the pine. If a fruit be meant, it is not easy to say what. The likeliest in appearance would be that of a *pandanus*, or screw-pine, which has been so called, I imagine, from the general resemblance of both fruit and leaves to the pine-apple (*ananas*).* No species of this appears to afford food in Pegu, but as Mason says that the fruit of one species is used "to hackle thread," Conti might have seen it in the bazars for sale.

There is also a scaly fruit, looking much as if it were covered with the skin of a carp, which I have seen and tasted in Java. This is the fruit of a kind of rattan (*Zalacca edulis*, *sálák* of the Javanese), and grows also in Pegu or Tenasserim.

The late M. Pauthier, in a translation from the Chinese, has a passage which, if correct, would carry, not pine-apples, but tobacco, back to the age of Chinghiz Khan, nearly 300 years before Columbus. In his version of the *Voyage de Khieou* (or Chang-Chun) in *Journ. Asiatique* for January 1867, this traveller through Central Asia is made to say:—"They then began to meet men who smoked tobacco (*yen*), in collecting that which fell upon the ground" (p. 44). The translator makes no comment on this remarkable statement, which (omitting the manna-like descent) reminds one of the story in Herodotus, of certain Scythians who intoxicated themselves by the smoke of a certain fruit, and will, probably, be quoted some day in connection with the clay-pipes of the Firbolgs, which I remember seeing long ago in the Museum of the Royal Irish Academy, as well as certain iron pipes which I have seen in the late M. Troyon's Museum on the Lake of Geneva.

It is remarkable, however, that Dr. Bretschneider of Peking, who has lately published an English translation of the travels of Changchun,† gives nothing about smoke or tobacco, and, in his version, instead of: "they then began to meet men who smoked tobacco," we find: "*where we began to find settlements*." He explains, in his prefatory remarks, that the word *yen* here means, not tobacco smoke, but the smoke of habitations! This gives one a serious view of the difficulties of translation from the Chinese, and of the danger of hasty deductions from such translations.

One more suggestion of an historical possibility in connection with the vegetable world. The European words for a poplar tree (*Populus*, *Pappel*, &c.) strongly resemble *pippala*, the Sanskrit name for the *Ficus religiosa* (*Hind. Pipal*); and that tree has in its foliage a very strong resemblance to some poplars, especially the aspen. May it not be possible that the

* Conversely, according to Crawford, the Macassar people call the *ananas Pandang*, from being so like the *Pandanus* (*Hist. Ind. Arch.*, i., 428).

† In the *Chinese Recorder and Missionary Journal*—Shanghai, 1874, see pp. 122 and 178.

Aryans, on meeting with the *Ficus religiosa* in the Indian plains, gave it the name of a tree which it strongly recalled, and which they had known in a previous stage of migration? I once made this suggestion to a very learned man, but it was rejected somewhat contumeliously, and the resemblance between the two trees was disputed or denied.

There may be better reasons against the suggestion, but I admit no doubts as to the superficial resemblance. It is so strong that Frenchmen are apt to call the *pīpal* "*peuplier d'Inde*." Of this I have met with several examples; I may quote Bishop Pallegoix's book on Siam (i. 86; and 140).^{*} Moreover here in Palermo, some years ago, I saw a young *pīpal* tree in the Butera garden (since destroyed). The gardener gave it the same name, *pioppo delle Indie*. And more lately I have found that my suggestion of the identity of *pīpala* and *Populus* was anticipated by a professed botanist, the late Major Madden of the Bengal Artillery. And he mentions that the *Populus ciliata* is called by the people in Kumaon *Gar-pīpal*.†

Pass we to oranges. The ordinary large orange is sometimes called in Hindustani *Sangtarah*, and the usual explanation of this (the suggestion occurs in Shakespear—not William but John) is that it is a corruption of *Cintra*. The term *Sangtara*, however, occurs in Baber's commentaries,‡ and on this account some have doubted whether *Cintra* oranges could have been known by that name in India so early. And I remember this being discussed by Sir Henry Elliot on the only occasion on which I ever met that lamented scholar and statesman. He suggested that the derivation of *Sangtarah* might be *Sang-tar* "green stones" (or moist pips in fact).§ It is probable, however, that Shakespear is right. For two centuries before Baber writes *Abulfeda*, as done into French by M. Reinaud: "Au nombre des dépendances de Lisbonne est la ville de Schintara; à Schintara on recueille des pommes admirables pour la grosseur et le goût" (p. 244). And, on this Saracenic soil where I write, the only usual name for these oranges is *Portugalli*, which no doubt is the sense of the name which travelled further east as *Schintara* or *Sangtara pommes*.

In turning up that illustrious book, Erskine's *Baber*, for the preceding reference, I came on what he says of the Jack-fruit: "It looks like a sheep's stomach stuffed, and made into a haggis. . . . The fruit is very adhesive; on account of this adhesive quality many rub their mouth with oil before eating them. They grow not only from the branches and trunk of the tree, but even from its root. You would say that the tree was all hung round with haggises."|| This inimitable description brings back my own amazement when I first saw a jack-tree hung with fruit. I am grieved to

* The Bishop transposes the names of the two well-known Indian figs, calling *pīpal* what is really the banyan. But it is the true *pīpal* that he calls *peuplier*.

† *J. A. S. B.*, xvii., part i., p. 381.

‡ Erskine's, p. 328.

§ This circumstance was recalled in Section E. of the British Association at Edinburgh in 1871, by an old friend who had been present at the same time, then Lieutenant, now (alas Posthumus!) Major-General Richard Strachey, R.E., C.S.I., of the Indian Council.

|| The new translation into French is here so inferior in graphic accuracy that we must really hope it does not better represent the original: "Il pousse non seulement sur les branches de l'arbre, mais encore sur le tronc, où il fait l'effet de bourses qu'on y aurait suspendues."—(II., 211).

say that I never tasted the latter, and hence did not know about the "adhesiveness" (which mortal men in these less Johnsonian days call *stickiness*). Hence I was perplexed by Friar Odoric, who mentions the same circumstance, saying: "and when you eat these, it is just as well to oil your hands and your mouth."^{*}

To return, before concluding, to the custard-apple and pine-apple. Both of these appear in the *Ain-i-akbari*,† as does also the Guava, all three of American origin. The author says that pine-apples were called *Kaḥal-i-Safari* or "jack-fruits for travels, because young plants put into a vessel may be taken on travels and will yield fruits." *Pace* Abul Fazl, this reads like nonsense. I know that guavas in India are still often called *Safari Am* or "Journey mangoes," and one would be inclined to seek the explanation of both names in the journey the fruits had made—"peregrini," if idiom will admit. A note, quoted by Mr. Blochmann from Jahangir's memoirs, shows that the pine-apples at the Mogul court came from the Portuguese settlements on the western coast. To one who has seen the hundreds of acres of pine-apples on the islands about Singapore, or the seemingly wild profusion of them in the valleys of the Kasia Hills,‡ it is difficult to conceive them of foreign introduction; as difficult as it is to conceive of Mediterranean cookery without tomatas, or stony Sicilian slopes without cactuses. Yet both these are also from America.

When at Batavia in 1860, my morning walk often led me past a signboard which bore the words *Stoom Ananassen*. What these "Steam Pine-apples" were I have never been able to learn, or even to imagine.

I see from Crawford's Dictionary that in the Malay regions the custard-apple is called *Nona*, which seems to be the American name, whence, and not from its being ever regarded as the staff of life (as Dr. Birdwood seems to think), it is called *Annona*.§ Neither *Annona* nor *Ananas* is mentioned by Baber among Indian fruits; I mean neither by these names nor by any others.

H. YULE.

Deep-Sea Soundings in the Pacific.—Captain Erben of the United States' steamer 'Tuscarora,' lately commanded by Captain Belknap, has just completed a series of soundings between San Francisco and Honolulu in the Sandwich islands. At the first cast, a short distance outside the Farallones, bottom was reached in 435 fathoms. The depth then gradually increased to 2561 fathoms. In latitude 33° 10' N., longitude 132° W., it shoaled rapidly, and 5 miles further, in latitude 32° 58', it was found to amount to 385 fathoms only. Thirteen casts were taken here within a radius of 5 miles, and these, as well as the lava and coral brought up by the lead, clearly proved the existence of a submarine volcano, rising to a height of about 13,000 feet above the general level of the ocean bed. On leaving this spot the depth increased rapidly, and in latitude 24° N., longitude 152° W., it attained its maximum, viz., 3115 fathoms. The temperature of the sea water at the bottom was found to vary very little from 35° or 36° Fahrenheit.

* See *Cathay*, &c., p. 79.

† See Blochmann's Translation, I., 66, 68.

‡ When the writer knew the Kasia Hills—no matter how many years ago—100 pine-apples cost a shilling.

§ *Annon* is the name as given by Oviedo.

Reviews.

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MERCHANT SHIPPING AND ANCIENT COMMERCE.*

THE production of these volumes has been a labour of love to the author—who certainly knew his true vocation in life when, at an early age, almost fifty years ago, he ran away from home, and joined a ship sailing for the West Indies as a cabin boy. His rise in the merchant service was rapid, for already at twenty-one he commanded a bark trading between Bushire and Bombay. On quitting his sea life he set up as a shipowner in England, and was so successful in his new business, that he was able to unseat Mr. Hudson as a Member of Parliament for Sunderland, and maintain his seat for that great shipbuilding town for seventeen years after. In fact, he only gave up the representation of that on account of the failure of his health; and since then has devoted himself to working up the history of his own profession. Although familiar with most subjects relating to Merchant Ships, Mr. Lindsay has naturally found it alike necessary and desirable to look to others more intimately trained to letters than himself, for aid in the preparation of his work, and he especially acknowledges in his preface the valuable assistance he has received in connection with the two volumes now presented to the public from his friends Sir Patrick Colquhoun, Q.C., and Mr. Vaux, F.R.S. Mr. Lindsay proposes, as he says in these volumes, which comprehend only half of his whole scheme, to lay before his readers a complete history of Maritime Commerce, extending from the earliest period to the launch of the last great steamer from Messrs. Laird's yards this year. In carrying out this scheme he has given many and very interesting details of the origin of boats of all kinds, from the days when our primitive parents disported themselves on logs and coracles, to those when the galleys of Venice and Genoa swept the Mediterranean in the pursuit of a commerce not always legitimate. In the pursuit of his general subject Mr. Lindsay has much to say on commercial intercourse other than that obtained by the aid of shipping, and perhaps, therefore, not the least valuable portion of his first volume is that which he has devoted to a minute and careful account of the early caravan-routes across Asia and Africa, illustrated, as they are, by an excellent map, drawn under his own eye. Having discussed at considerable length all that has been done on land by the ship of the desert—the camel—Mr. Lindsay then addresses himself to that part of his main subject with which, as an old sailor, he is naturally most familiar—the various sea voyages undertaken with the view of bringing the legendary wealth of the East into the eager markets of the West, from the days of King Solomon to the establishment of Alexandria as the great emporium of the nations of antiquity. In this, from its wide range, necessarily rapid survey, comprehending as it does, not only the coasts of India and the Red Sea and Persian Gulf, but also the East Coast of Africa as far

south as Sofala, Mr. Lindsay deals with many speculations from the days of Herodotus to Humboldt, and endorses the view of the latter philosopher, that the traditionary story of the circumnavigation of Africa, which the Greek historian ridiculed, presents no improbability to those, who, like himself, have "gone down into the sea in ships." Passing on, Mr. Lindsay sketches the history of the early commerce of India and Ceylon, and the Golden Chersonesus and Java. In 1838, the author, when in command of the 'Olive Branch,' in the Persian Gulf, frequently traced the course of Alexander's fleet under Nearchus, and is peculiarly able to appreciate the dangers and difficulties which the Greek admiral must have experienced. Moreover, like Alexander's fleet, he had often to anchor his bark for the night, owing to the intricacy of the navigation, and was himself attacked by the lawless robbers of the sea coast—just as the Greek sailors were on the same spot, near Bushire, more than 2000 years before.

Mr. Lindsay next traces the commerce of the West in Roman and mediæval times, and enters into a full and elaborate investigation of its development in Genoa, Venice, Britain, and America, giving at the same time comprehensive narrative of the voyages and life of Columbus. Not the least valuable part of this portion of his book is his examination of the maritime laws of different nations during the mediæval period, especially of the Rôles d'Oléron, and his sketch of the lives, manners, habits, and practices of the sailors of those days. It will be important to remark the great change for the better in the condition of merchant sailors that has since taken place, although it has been almost wholly brought about only during the present generation. The whole tendency of legislation for the merchant navy has in our time been unquestionably for the comfort of the sailor, and therein for the general benefit not only of those employed in the navigation of vessels, but of their owners, and of the nation itself. We do not now brand on the forehead, or slit noses, or "keel-haul," but the services our sailors render are not thereby less efficient. Mr. Lindsay devotes his ninth chapter to the methods of ancient rowing, and to the reasons which he thinks prevailed with the ancients in their classification of galleys, as triremes, quinqueremes, octoemes, &c., and though he may not have altogether solved this vexed problem, the credit is due to him of having spared no pains in its investigation. The probability is that there is some double or latent meaning beneath the names which have been handed down to us from ancient times, and that we shall not arrive at any certain conclusion on this subject until we have an opportunity of making researches far wider and more exhaustive than any that have yet been undertaken. Sooner or later, possibly, some sculptured monuments may be unearthed, giving a clearer notion than we can have at present as to the disposition of the oars, and of the rowers for classes of ships larger than the bireme. How this was done in the case of such ships, of only two banks of oars, we can form some idea from the sculpture at Nineveh, of which Mr. Lindsay has given a drawing (p. 276); but for all above this size we can have no certainty, as the documentary evidence in ancient writers is on this head hopelessly obscure. There must be many of these galleys lying intact down in the ooze of the Mediterranean, which might

* *History of Merchant Shipping and Ancient Commerce.* By W. S. Lindsay. In four volumes. Vols. I. and II. Sampson Low & Co. London, 1874.

possibly be got at by dredging and submarine excavation.

In his second volume Mr. Lindsay gives much interesting information on the progress of maritime discovery, and especially of the results of the famous voyages of Vasco de Gama, Sebastian Cabot, Hawkins, and Drake, to the time of the peaceful and scientific researches of Dampier and Cook, proving as to Cabot, from documents only recently made known, that the discovery of America, as distinct from the islands of the Gulf of Mexico, is strictly due to the enterprise of Englishmen. It is now certain, though the fact in no way detracts from the merits of Columbus, that North America was discovered by Cabot and his party, Columbus not having reached the mainland of the continent until his third voyage in August 1498. On the other hand, he shows no less clearly, that if we have some reason to pride ourselves on the daring and zeal of the early English navigators, the eternal infamy of having introduced, and for years promoted, the Slave Trade in America, is as certainly due to Queen Elizabeth, and the piratical captains and bold buccaneers who sailed under her ensign.

In the fifth chapter of the second volume Mr. Lindsay has given us a carefully worked out history of the English Navigation Laws, as first introduced by Cromwell, and promoted with even greater strictness on the restoration of Charles II., and after the separation of the United States from this country. On this branch of his subject, Mr. Lindsay writes in a fair and liberal spirit, not shrinking from stating unreservedly the commercial errors which the policy of 1652 entailed upon this and other nations; but at the same time, in opposition to many with whom he cordially acted during the several years when he represented Sunderland in the House of Commons, maintaining firmly that, with the restrictive policy of the Dutch and French in full force, England had no alternative but to impose her stringent navigation laws. That the times have so much changed that this, the last rag of protection, has been swept away, is, it need scarcely be added, a source of the deepest satisfaction to our author. In chapters 7, 8 and 9, we find a long and accurate account of the commercial relations between England and the rest of the world during the terrible war with France, and a full statement of the effect of the English "Orders in Council," the necessary reply of this country to the manifesto of Bonaparte known as the "Berlin Decree." Mr. Lindsay handles the somewhat delicate matters arising out of the complications between France and America, and America and England, with equal tact and good sense, at the same time frankly asserting, where necessary, the right of this country to act always according to the dictates, as understood and expressed by a free Parliament, of her own interests. An old Whig, in some respects even an advanced Liberal, Mr. Lindsay sees merit in the pluck and English dauntlessness of Pitt's administration, whilst he condemns as unreservedly the shuffling policy of the Whig opposition with reference to the Orders in Council, and the shortsighted subservience of the rulers of America to the imperious views and wishes of Bonaparte. Bonaparte, as everybody knows, failed utterly in his Russian campaign, and Barlow died in Poland, and the Americans found themselves at war with England on grounds which not one of their historians ever ventures to defend, and

which their statesmen of to-day would heartily repudiate if war, on such shallow and selfish pretences, was again attempted. In his 12th chapter Mr. Lindsay has brought together a complete and succinct account of the origin and progress of the Dock system in England, compressing into a few clear and readable pages much that is scattered through Blue Books and other ponderous tomes. He adds an admirable map of the existing docks at Liverpool, one of the most remarkable results of man's ingenuity and power to be met with in the world. The 13th chapter is an impartial narrative of the successes and misfortunes of the East India Company, from their earliest days to their final extinction as a great trading body in 1834,—a narrative which will be new to many readers who have, perhaps, imagined that the greatness of this Company resulted from their commercial operations. Mr. Lindsay brings out clearly that it was as a great political, rather than a great commercial, corporation that the Company flourished so splendidly. It but illustrated the immense capacity, as fresh now as ever, of the English race for imperial rule. The last (14th) chapter contains a most interesting account of the ordinary duties of merchant officers and seamen, ashore or afloat, with some notice of the various changes that have taken place in the internal economy and administration of ships from the time he entered the service some forty years ago. He has added a remarkable note to page 497, in which he gives a portion of his own personal experiences when an "apprentice" in the trade between Demerara and England. It can be compared only to the anecdotes of Fielding and Smollett a century earlier. The admirable and authentic illustrations scattered through Mr. Lindsay's volumes greatly enhance their value. Amongst the number are many woodcuts from Mr. E. W. Cooke's *Etchings of Shipping and Craft* (London, 1829). Two more volumes will shortly appear and complete Mr. Lindsay's work, and will be devoted to a comprehensive history of steam and steam navigation to the present year.

GEORGE BIRDWOOD.

Cartography.

Kiepert's New Map of Palestine.*

THERE is probably no geographer better qualified than Professor H. Kiepert of Berlin to produce a map of Palestine. To him we are indebted for the maps accompanying Robinson's standard works and to many others referring to Syria and Western Asia generally, and he has been fortunate enough to have been able during a journey to the East, in 1870, to clear up some doubtful points of geography on the spot. The map before us is based upon the most recent researches, including the labours of the Palestine Exploration Fund, as far as they have been published, and Warren's reconnaissance of Ammon and Hesbon, which the author was permitted to copy when at Jerusalem. We share Dr. Kiepert's regret that Wetzstein should not yet have published the results of his journey into Jolan and Jedur, which would have filled up an awkward gap in the very centre of the map, and are not surprised to hear that personal obser-

* H. Kiepert, Neue Wandkarte von Palaestina. 8 sheets. 1 : 200,000. Size 49 by 78 inches. With notes. Berlin, 1874. (London, Trübner). 8s. in sheets; 16s. 9d. mounted, on rollers.

vation on the spot confirmed the opinion of other travellers as to the untrustworthiness of Van der Velde's map. Dr. Kiepert's map is very tastefully printed in colours. The hills are effectively shaded in chalk, permanent rivulets are coloured blue, torrents (wadis) are shown in black, fertile tracts are tinted green, deserts pale brown. Great care has been taken in the identification of places, and speculative identifications, based merely upon a supposed resemblance of a modern name to some ancient one, have very properly been rejected. The identification of Gezer, by Ganeau, of Tarichea by De Bruyn and Quandt, of Sephath and Kades Barnea by Palmer and Drake, of Lita with the modern Litane (of which Leontes is a corruption) by Noeldeke, and many others have been taken notice of, and in this respect, as well as in the general correctness of the topographical features, Kiepert's map is certainly superior to the one in Smith's Atlas. The nomenclature distinguishes between the Hebrew names of the Old Testament, old names used in a Grecised form, Greek, and modern names, and is amply sufficient for purposes of biblical study. A marginal map shows the boundaries between the twelve tribes and the Levitical cities, and there is likewise a plan of Jerusalem, based upon Major Wilson's survey. Kiepert, after an examination of the locality, is of opinion that Robinson's and Schulz's hypothesis respecting the third wall is erroneous, and accepts Krafft's identification of the ancient outer wall with the existing northern wall of the town.

Two smaller editions of this map are being prepared for publication, the one, a wall map for the use of schools, on a scale of 1 : 300,000, the other a hand-map, on a scale of 1 : 800,000, and if this latter contains the whole of the information of the larger wall-map, it cannot fail to become a favourite with biblical students.

E. G. RAVENSTEIN.

French Admiralty Charts.

Published by the Dépôt de la Marine.

- Skagerak. Fjord de Christiania. Par E. Morin. Paris, 1874. 1s. 8d.
Côte nord d'Espagne: Santander. Par Hémery. Paris, 1874. 1s. 8d.
Terre Neuve. Côte ouest. Anse de Petitpas dans la rivière Humber. Par Wuhrer. Paris, 1874. 5d.
Amérique septentrionale. Côte orientale. Ile de Sable. Par Hémery. Paris, 1874. 10d.
Amérique septentrionale. Caroline du Nord. Entrées de la river du cap Fear. Les bancs au sud du cap Fear. Par Hémery, d'après Ploix. Paris, 1874. 1s. 10d.
Antilles: ile de la Dominique. Baie du Prince Rupert. Par P. Méa. Paris, 1874. 7½d.
Antilles: ile de Saint Dominique. Baie Manzanillo. Par P. Méa. Paris, 1874. 7½d.
Antilles. Ile de la Jamaïque. Port Morant. Par Hémery. Paris, 1874. 7½d.
Mer des Antilles. Etats-unis de Colombie. Port Carreto. Par A. Martin. Paris, 1874. 5d.
Mer der Antilles. Côte du Venezuela. Anse de Carupano. Par A. Martin. Paris, 1874. 5d.
Mer des Antilles. Côte du Venezuela. Port de Chichirivichi. Par A. Martin. Paris, 1874. 5d.
Algérie. Carte de l'île de la Galite. Par P. Méa. Paris, 1874. 10d.
Algérie. Iles Habibab. Par Méa. Paris, 1874. 10d.
Côte sud-est de Madagascar. Fort Dauphin, Loucar, Sainte-Luce. Par P. Méa. Paris, 1874. 1s. 8d.
Côte ouest de Madagascar. Baie de Bembatooka. Par F. Dufour. Paris, 1874. 10d.
Côte orientale d'Afrique.—Côte et port de Zanzibar. Par Dufour. Paris, 1874. 10d.
Mer Rouge. Plan de la rade de Djeddah. Par E. Hémery. Paris, 1874. 10d.
Mer Rouge. Port de Sawakin ou Souakin. Par E. Dufour. Paris, 1874. 5d.
Mer Rouge. Mouillage des îles Safajah. Port de Massoua. Par E. Dufour. Paris, 1874. 10d.
Plans de la Mer Rouge: Khor Dhu-i Lawa.—Ile Disci—Khor Shinab. Par E. Dufour. Paris, 1874. 5d.

- Plans dans la Mer Rouge; port de Tor ou Tur.—Shern Wej'h.—Iles Frères. Par E. Dufour. Paris, 1874. 5d.
Golfe de Siam. Croquis du mouillage et des îles Bai-Ba-lung. Par Delamare. Paris, 1874. 10d.
Archipel de Soulou. Cagayan Soulou et îles adjacentes. Par Delamare. Paris, 1874. 10d.
Japon. Côte sud de Nipon. Croquis de bozen Iwa ou Banc Lady Inglis. Par P. Méa. Paris, 1874. 7½d.
Japon. Mer intérieure (Sténo-no-utchi). Plan des canaux entre Odutsi et la pointe d'entrée de la baie d'Okayama. Par E. Dufour. Paris, 1874. 1s. 8d.
Japon. Mer intérieure. Iles de l'Harima-Nada. Par Dufour. Paris, 1874. 1s. 8d.
Japon. Ile Saghalien. Rade de Kousounai. Par Delamare. Paris, 1874. 7½d.
Japon. Côte ouest de Saghalien. Rade Korsakovsk. Par E. Delamare. Paris, 1874. 5d.

Log Book.

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The Arctic Expedition.—In our last number we gave some account of the services of Captain Nares, Commander A. H. Markham, and Lieutenant Pelham Aldrich, who had been appointed to the Arctic Expedition. The following officers have since been selected to serve in this great enterprise:—Lieutenant Lewis A. Beaumont entered the service in 1862, and was promoted to the rank of lieutenant, out of the Royal Yacht, in 1867. He served on board the 'Blanche' on the Australian Station (of which vessel Commander Markham was First Lieutenant), from 1868 to 1871. He then qualified for Gunnery Lieutenant on board the 'Excellent,' was appointed as Instructor in the torpedo experiments, and was selected as Gunnery Lieutenant of the 'Lord Warden,' flag-ship in the Mediterranean, on September 4th, 1874. Lieutenant A. C. Parr entered the service, on board the 'Victoria,' under Captain Goodenough (flag of Sir Robert Smart), of which Commander Markham was a lieutenant, and served in the Mediterranean from 1864 to 1867. He was afterwards in the 'Pylades' and 'Hercules' (Captain Sherard Osborn), and in June 1874 was appointed Gunnery Lieutenant of the 'Monarch.' Lieutenant W. H. May also commenced his naval career in the 'Victoria,' from 1864 to 1867, and subsequently served in the 'Liffey' and 'Hercules.' He has since been studying at the Royal Naval College at Greenwich, and gives up a good prospect of a college fellowship, from zeal for Arctic service. Lieutenant Wyatt Rawson entered the navy in 1866, on board the 'Minotaur' (Captain Goodenough), and was afterwards in the 'Narcissus,' in the flying squadron. During the Ashanti war he was in the 'Active' (Commodore Hewett), and distinguished himself in the march to Kumasi with the naval brigade, when he was wounded. Lieutenant Reginald B. Fulford attained that rank on August 8th, 1874, and is now studying at the College at Greenwich. He is of the old Devonshire family of Fulfords of Fulford, one of the daughters of which, Mistress Faith Fulford, married John Davis of Sandrudge, the famous Arctic navigator and discoverer of Davis Straits. Lieutenant Robert H. Archer was in the 'Galatea' from 1867 to 1871, obtained his Lieutenant's commission in 1872, for having got full numbers at the examinations, and has since been serving in the 'Agin-court,' flag-ship of Admiral Hornby. Lieutenant G. A. Giffard obtained his present rank on August 28th, 1870. Sub-Lieu-

tenants G. Le C. Egerton and Crawford J. M. Conybeare have been appointed. Dr. Thomas Colan, M.D., lately in the receiving ship at Dundee, and Dr. Edward L. Moss, M.D., who has been, for two years, in charge of the Esquimalt Hospital at Vancouver's Island, are the medical officers of the Expedition.

Each ship will have an assistant-paymaster in charge, and two engineers. The officers of the former rank are Mr. Thomas Mitchell and Mr. Edgar Whiddon. The engineers are Messrs. James Melrose, James Wootton, John Pitt, and George White. A botanist, and a zoologist have been recommended to the Admiralty for appointments, by the Royal Society, but no official decision on this subject has yet been arrived at.

Six ice quarter-masters have been selected and entered for the expedition by Commander Markham, three belonging to Peterhead, and three to Dundee. The oldest and most experienced are John Thorés and William Dougall, harpooneers, of Peterhead. Alexander Gray, of Peterhead, is a harpooneer of sixteen years' standing, and has passed five Arctic winters at Cumberland and Exeter Bays. David Deuchars, of Dundee, was a loose harpooneer in the 'Arctic,' in 1873, when he was a shipmate of Commander Markham. John Taws, of Dundee, is a harpooneer, and has passed one Arctic winter at Lievely, when the whaler 'Columbia' was lost. The name of the sixth man is James Berrie, of Dundee, who has served as a boat steerer.

The Arctic Manual.—It is very desirable that all existing information respecting Greenland, in every branch of science, should be brought together; in order that the explorers may be enabled to conduct their investigations with a full knowledge of all that has been done before, and with the means of comparing the scientific results, in the unknown area, with those on the known coasts of Greenland. Such information is now scattered in many separate volumes of Transactions of Societies, and in several languages. The Arctic Committee of the Royal Geographical Society have had under their consideration a proposal to prepare a *Manual for the Arctic Expedition*, containing such information, and the idea, at their suggestion, has also been taken up by the Committee of the Royal Society.

The greatest living authority on all scientific questions connected with Greenland is undoubtedly Dr. Robert Brown, M.A., F.R.G.S., without whose aid and advice it would not be possible to prepare a complete manual of the kind required. Dr. Brown is now on the Arctic Committee of the Royal Geographical Society, and will actively assist in the preparation of that portion of the manual which will be undertaken under its auspices. This will include the structural geography of Greenland, the physics of Arctic ice generally, and the condition of the ice at the various points along the threshold of the unknown region. Ethnological information will also be of great assistance in the event of the expedition falling in with inhabitants, or with vestiges of them, within the unknown area. A careful descriptive list of all vestiges of inhabitants that have hitherto been met with in the Parry Islands, and on the east and west sides of Greenland will be useful, together with descriptions of relics, lists of all native names of places with meanings, vocabularies, and a short grammar.

For the geology of Greenland there is no better account than Dr. Brown's "Geological Notes of the Noursoak Peninsula and Disco Island," in the *Transactions of the Geological Society of Glasgow*, which contains a full description of the fossil flora. It is to be hoped also that Dr. Hooker's valuable and suggestive paper on the "Outlines and Distribution of Arctic Plants," may be reprinted from the *Transactions of the Linnean Society*, with a complete list of Greenland plants, and their ranges up to the latest date. Accurate descriptive lists should also be provided of the Greenland zoophytes, echinodermata, mollusca, fishes, birds, and mammalia, from various sources in England, Germany, or Denmark. The great value of a manual for the use of the Arctic Expedition, containing such information as has been sketched out, is well understood, and we are glad to be able to announce that a section has been undertaken by the Arctic Committee of the Geographical Society; while, at their suggestion, another portion will be edited by Mr. Rupert Jones, under the supervision of a Committee of the Royal Society.

The History of the Mission to Tibet in 1774.—Intercourse between Tibet and India must once, at the time when the tenets of Buddhism found their way from the valley of the Ganges to the frozen plains of Bod, have been frequent and unchecked. It has since been entirely destroyed by the policy of the Chinese Government, and the passes are now as closely watched as they ever were. At no time, since the English got a footing in the East, has this intercourse been so nearly restored as during the active and far-seeing rule of Warren Hastings. That great statesman, the only Governor-General whose memory has really found a permanent place in the minds of the people of India, sent two missions to Tibet, and none has ever reached that country since. That of Captain Turner is well known from the narrative published in a quarto volume in 1800. But the first and more important mission has, owing to the untimely death of the envoy, been lost sight of, and no account of it has ever been published. Searches have often been made, both in the India House and at Calcutta, for official reports relating to Mr. Bogle's mission to Tibet, but without success. It now turns out that all the manuscripts were, on Mr. Bogle's death at Rungpore in 1782, sent home to his family, and they have since remained in the possession of his representatives. Through the courtesy of the lady who is the actual possessor, these documents have lately been allowed to be examined, and made use of, and a history of this important Tibetan mission will now be published. The Bogle manuscripts, besides journals, reports, narratives, and despatches, consist of a large mass of private correspondence, including many inedited letters of Warren Hastings, Sir Elijah Impey, Sir Gilbert Elliott, Dr. Hamilton, and other eminent men.

The work, which is about to be published, will consist of a preface giving some account of the materials, an introduction containing a sketch of Himalayan and Tibetan geography, and an enumeration of all previous and subsequent journeys, and a short account of the life of Mr. George Bogle, the envoy to Tibet in 1774-75. The first chapter will include an account of the causes which led to the intercourse with Tibet, and the minutes and instructions of Warren Hastings. The second will be a narrative of Mr. Bogle's journey.

Tassisudon, the capital of Bhutan, and the five next will comprise an account of his residence there, of his conversations with the Deb Raja, a history of Bhutan, and the official despatches. Chapter viii. will contain a narrative of the journey from Tassisudon to Desheripgay, the residence of the Lama of Tibet, and the following chapters will include the negotiations with the Lama, reports on the trade and government of Tibet, an interesting account of Mr. Bogle's stay at Teshoo Lumboo, and a narrative of his return journey. The text will be illustrated by many additional notes from the private correspondence, and the work will be illustrated by a new map of Tibet, with all the latest discoveries, and of the mountainous region between Tibet and India.

Maintenance of Order in Peru.—The stability of the Peruvian Government under the presidency of Don Manuel Pardo, and the determination of the Peruvian people to terminate the period of recurring civil wars, have received a striking proof during the last two months. In former times when a general landed on the coast and proclaimed a revolution, there were simultaneously risings elsewhere, and the whole country was soon in a deplorable state of confusion. The attempt, under the adventurer Nicolas Pierola, in the end of 1874, has had a very different result. He indeed succeeded in landing on the coast from an English steamer, and in seizing upon Moquegua by surprise, but he was forced to retreat into the mountains almost immediately afterwards. His profligate attempt met with no sympathy.

Pierola entrenched himself, with the aid of General Segura and a few followers, on a height called Torata, and the fact of his retreat into the fastness showed that the days of successful adventures of this kind are numbered. Señor Pardo made prompt and very judicious military arrangements to nip the insurrection in the bud. Reaching Arequipa on December the 5th, with General Buendia, he at once took the supreme command, and marched through Moquegua to the village of Charsaques, at the foot of the range of Torata, occupied by the insurgents, who numbered about 1000 men. The President faced them with a force, under Colonel Riverola, consisting of two regiments of the line, one of the Lima national guard, a force first raised by Señor Pardo, and a small detachment of artillery, in all 1300 men. But another force had been sent into the interior to attack the rebel position in the rear, consisting of two regiments of the line under the gallant young sea captain Montero. Hastily collecting some national guards from Lampa and Puno, Montero led his division across the wild *puna* of the Andes, towards Torata. As soon as Montero's division was about due, the President, who had made his calculations with admirable precision, directed an attack against the front of the rebel position, covered by the artillery. After having been eight hours in action, the troops were ordered to return to their camp, having fully succeeded in the object of drawing off attention from the movements of Montero. No sooner had this been done, than Montero fell upon the rear of the insurgents, and completely routed them at a place called Besena Vista, on the Torata height. Pierola and Segura escaped, but the insurrection was entirely crushed, and order has thus been maintained. In fact, no response was made to Pierola's call, and the result has shown that the people

of Peru regard armed revolution with displeasure. The triumph of the civilian President is a further proof of the stability of his Government, and of the great advance in the appreciation of peaceful industry and progress which has been made by the Peruvian people of late years.

Colonel Gordon's Expedition.—Lieutenants Watson and Chippendale R.E., who left England to join Colonel Gordon, as surveyors, last summer, arrived at Gondokoro on November the 14th, 1874. They have now proceeded to explore lake Albert Nyanza in a small steamer built for the purpose, which had previously been conveyed to Duffé, a station above the falls that obstruct navigation between Gondokoro and the lake. M. Lenant, another member of the expedition, will proceed to and explore the Victoria Nyanza.

Correspondence.

ARCTIC EXPLORATION AND THE DOGS OF GREENLAND.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Now that it is definitely settled that an expedition is soon to leave our shores for the further exploration of the Polar regions, those who are responsible for its equipment and provisioning will have an anxious time of it in providing everything that may not only prove likely to avert disaster, but that will also ensure, so far as mortal foresight will permit, the largest measure of success. Whatever the arrangements may be, we need have no fears as to their completeness and suitability to the end in view; but it struck me that the question of "sledging" is one which will require serious consideration, as ice-travelling may form an important feature in the task which our explorers will have set before them; and in connection with this mode of obtaining access to otherwise inaccessible regions, comes the provision of animals to draw the sledges. Doubtless, this can be accomplished by men, but the fatigue is very great, and the speed anything but satisfactory when the achievement of a journey within a comparatively brief period is of moment.

As is well known, the animals hitherto employed in these explorations have been dogs of the Esquimaux breed; and, in fact, these creatures are at present almost, if not the only beast of draught in Greenland. Several of our own Arctic explorers have employed them for their land and ice-journeys, and have commended them for their excellent qualities during these expeditions; while it is generally acknowledged that they are essential to the existence of the people in these latitudes, who rely upon them for transport; and several authorities, amongst others Wrangell, have indicated what a misfortune it would prove to these tribes did anything befall their canine slaves and companions—such as a contagious disease.

It would appear that the dogs of Greenland have been until lately exempted from many of the maladies which afflict their species in more favoured lands; at any rate, with one or two exceptions,* we have no record of their being visited by those wide-spread diseases which on many occasions have almost decimated the race of dogs in temperate regions; and we have been inclined to look upon the Esquimaux dog as the hardiest and healthiest of all breeds. Among other diseases affecting the canine species which had not been observed in the far

* Wrangell mentions a serious outbreak of the specific catarrhal fever commonly known as "distemper" among the sledge-dogs in 1821.

north was dog-madness or "rabies"—that terrible scourge which is not only transmissible from one dog to another by inoculation, but can be communicated to mankind and all other creatures through the saliva of the sick beast. My researches have shown that this dreadful disease has been witnessed in Sweden, Denmark, Norway, Northern Russia, and also in Lapland, and even in an epizootic form, as in 1815 and 1824;* but there was no proof that it had ever been observed in Greenland and Kamschatka. The statement we have made to this effect was based on the reports of various travellers, and particularly of Erman, who, in describing the Ostyaks of Siberia and their dog-sledges, says: "Madness among the dogs would be, in this country, a most formidable scourge, and would infallibly cause the destruction of whole races of men; but everyone here (at Obdorsk) assured us that the disease is wholly unknown to them. Steller has stated the same thing respecting the dogs of Kamschatka; so that hydrophobia would seem to be one of the European results of living in towns. One essential and unailing distinction between the dogs of Siberia and those of Europe, lies in the very moderate food of the former; whence it might be inferred that it is excess, and not want, which generates the morbid habit."†

My belief in the correctness of this statement has, however, been rather shaken within the last few years; and it is with the view of warning our own explorers, and those who are making arrangements for, and sketching out the plan of their operations, as well as suggesting the desirability of collecting information with regard to the existence and prevalence of this malady, that the present notes are thrown together.

Kane was the first to lead me to doubt the trustworthiness of the statement that rabies was unknown so far north; and though I was rather perplexed with his description, yet my doubts have been confirmed by the accounts of more recent travellers. The first intimation Kane gives us of any disease among his Greenland sledge-dogs is when frozen-up in latitude 70° 41'. On October the 5th, 1854, he writes:—"Yesterday, the mother of one batch (of puppies), a pair of fine white pups, showed peculiar symptoms. . . . The animal was noticed this morning walking up and down the deck with a staggering gait, her head depressed, and her mouth foaming and tumid. Finally, she snapped at Petersen, and fell foaming and biting at his feet. He reluctantly pronounced it hydrophobia, and advised me to shoot her. The advice was well-timed; I had hardly cleared the deck before she snapped at Hans, the Esquimaux, and recommenced her walking trot. It was quite an anxious moment to me, for my Newfoundland dogs were around the housing, and the hatches were open. We shot her, of course."

Kane appears to have attributed the disorder to the absence of light during the sunless Arctic winter, as well as to the extreme cold; but he appears to have overlooked the fact that the Esquimaux dogs are accustomed to both, and that even imported dogs have resisted these influences without betraying any manifestations of such a peculiar malady. He writes, at a later period:—"The influence of this long, intense darkness was most depressing. Even our dogs, although the greater part of them were natives of the Arctic Circle, were unable to withstand it. Most of them died from an anomalous form of disease, to which, I am satisfied, the absence of light contributed as much as the extreme cold. January 25th.—The mouse-coloured dogs, the leaders of my Newfoundland team, have for the past fortnight been nursed like babies. No one can tell how anxiously I watch them. They are kept below, tended, fed, cleaned, caressed, and doctored, to the infinite discomfort of all hands. To-day I gave up the

last hope of saving them. Their disease is as clearly mental as in the case of any human being. The material functions of the poor brutes go on without interruption; they eat voraciously, retain their strength, and sleep well. But all the indications beyond this go to prove that the original epilepsy, which was the first manifestation of brain disease among them, has been followed by a true lunacy. They barked frenzically at nothing, and walked in straight and curved lines with anxious and unwearying perseverance. They fawn on you, but without seeming to appreciate the notice you give them in return, pushing their heads against your person, or oscillating with a strange pantomime of fear. Their most intelligent actions seem automatic; sometimes they remain for hours in moody silence, and then start off howling as if pursued, and run up and down for hours. So it was with Flora, our 'wise dog.' She was seized with the endemic spasms, and after a few wild paroxysms lapsed into a lethargic condition, eating voraciously, but gaining no strength. This passing off, the same crazy wildness took possession of her, and she died of brain disease—arachnoidal effusion—in about six weeks. Generally, they perish with symptoms resembling locked-jaw in less than thirty-six hours after the first attack. . . . My dogs that I had counted on so largely, the nine splendid Newfoundlanders and thirty-five Esquimaux of six months before, had perished: there were only six survivors of the whole pack, and one of these was unfit for draught. . . . Tiger, our last remaining dog, was seized with a fit ominously resembling the last winter's curse. In the delirium which followed his seizure, he ran into the water and drowned himself."* In a note it is added:—"Hydrophobia.—The caption at the head of the page is not intended to affirm the existence of the disease in this high north. Some of the tetanoid symptoms attendant upon tonic spasms closely simulated it; but the disease, properly speaking, is unknown there." And in another place, Kane mentions that of his dogs, "in spite of every effort, no less than fifty-seven perished, many of them with symptoms not unlike those of hydrophobia. The loss of these animals interfered seriously with my original scheme of research."

It will be seen from Kane's description that the mortality among his sledge-dogs was very great: indeed, they all perished. And it must be admitted that the symptoms enumerated by him, and particularly in the first case he mentions, bear a most striking resemblance to those noted in rabies; the duration of the disease, and its fatality, were also characteristic of the malady; while the pathological alterations in the brain, especially the effusion, are, as I have pointed out elsewhere, very frequently found in dog-madness. Kane had never seen rabies in the dog, and was therefore unacquainted with the symptoms of the disease, which he attributed, as I have already said, to the lengthened cold and darkness. But, as has just been stated, the Esquimaux dogs are accustomed to the severest degree of cold, and to the long Arctic night which continues for months; so that these could scarcely operate in producing such a fatal malady. Besides, other explorers previous to Kane had carried dogs even farther north, without witnessing this apparently anomalous disease in them. It was reserved for Hayes, who accompanied Kane in 1854, and who appears to have attentively observed this malady at that time, to make us better acquainted with it at a later period, and to prove that cold and darkness had nothing to do with its production and prevalence. In his *Open Polar Sea* we are made cognisant of the fact that it existed over nearly the whole of Greenland, where it had almost ruined the Esquimaux, by destroying their only means of transport.

On Hayes' arrival in Greenland in 1860, he discovered "that a disease which had prevailed among the teams during the past half-year, had diminished the stock to

* See my Works: *Animal Plagues* (London 1871), and *Rabies and Hydrophobia* (London 1872).

† *Travels in Siberia*, vol. ii., p. 34.

* *Arctic Explorations*, vol. i., pp. 106, 123, 156, 163, 459.

less than half of what was required for the prosperity of the people; and all our offers to purchase, either with money or provisions, were at first flatly refused, and were in the end only partially successful. . . . So great and universal had been the ravages of disease among the animals, that many hunters were wholly destitute, and none were in possession of their usual number."

In another portion of his interesting volume, he alludes to the outbreak in more detail. "I have mentioned that a disease had been for several years prevailing among the dogs of Southern Greenland, and that a large proportion of these useful animals had fallen victims to it. The cause of this disease had not been determined; but I was led to believe, from what information I could obtain, that it was purely of local origin, and that, therefore, when I had removed my teams from the seat of its influence I would be freed from its dangers. Under this impression, I had consumed much time at the Danish Esquimaux Settlements, in picking up here and there a dog, until I had obtained thirty-six animals. Up to the 1st of December they remained in perfect health; and being fed upon an abundance of fresh meat, I had great confidence that I should be able to carry them through to the spring, and when the period of my sledge explorations should arrive, that I would have four strong and serviceable teams. My fears were for a time somewhat excited by the information received from Hans, that the Esquimaux of Whale Sound and vicinity, with whom he had been living, were heavy losers by the death of a number of their dogs, and the description which he gave of this distemper corresponded with that of Southern Greenland; but November being passed without any symptom of the malady having made its appearance in my splendid pack, I felt hopeful that they would escape the visitation. The loss which Dr. Kane had suffered by the death of his teams was fresh in my recollection; but for this there appeared to be a sufficient cause. Being almost wholly without fresh food of any kind, he was compelled to subsist his teams upon salt meats, which, giving scurvy to his men, could hardly be expected to act otherwise than injuriously upon the dogs, which had always before been used to a fresh diet of seal meat.

"My hopeful anticipations were, however, not realised. One day, early in December, Jensen reported to me that one of the finest animals had been attacked with the disease, and recommended that it should be shot, to prevent the disease spreading; and this was accordingly done. A few hours afterwards, another one was seized in the same manner. The symptoms were at first those of great restlessness. The animal ran several times around the ship, first one way and then the other, with a vague uncertainty in its gait, and with an alternate raising and lowering of the head and tail, every movement indicative of great nervous excitement. After a while it started off towards the mouth of the harbour, barking all the time, and seeming to be in mortal dread of some imaginary object from which it was endeavouring to fly. In a little while it came back, still more excited than before. These symptoms rapidly increased in violence; the eyes became bloodshot, froth ran from the mouth, and the dog became possessed of an apparently uncontrollable desire to snap at everything which came in its way.

"The disease ran its course in a few hours. Weakness and prostration followed the excitement, and the poor animal staggered around the vessel, apparently unable to see its way, and finally fell over in a fit. After struggling for a little while in the snow, consciousness returned, and it got again upon its feet. Another fit followed soon afterwards; and then they came one after another in rapid succession, until finally its misery was relieved by death, which occurred in less than twenty-four hours from the incipience of the attack. Meanwhile I had watched it closely, hoping to discover some clue to the cause, and to establish a cure. But I could obtain no light whatever. Dissection revealed

nothing. There was no apparent inflammation either of the brain, the nerve-centres, the spinal cord, or the nerves themselves; and I was wholly at a loss to understand the strange phenomenon. That it was not hydrophobia was shown by the fact, that the animal rather desired than shunned water.* Many of the symptoms attending that disease were, however, manifested; but it did not, like hydrophobia, appear to be communicated by the bite; for those dogs which happened to be bitten were not more speedily attacked than the others.†

"This case had scarcely reached its fatal termination before another was reported, and it was relieved of its misery by a bullet. Seven died during four days, and I saw with consternation my fine teams melting away, and my hopes endangered, and while this was in progress I could only look on and wonder and experiment, but could never stop the contagion nor arrest the evil."

Another case, which still more closely resembles rabies, is described as follows:—"Among the first dogs attacked was a superb one that I have before named. He was the best draught animal of my best team, the second leader—Karsuk. I have never seen such an expression of ferocity and mad strength exhibited by any living creature, as he manifested two hours after the first symptoms were observed. Thinking that confinement might do good, and desiring to see if the disease would not wear itself out, I had him caught, and put into a large box on the deck, but this seemed rather to aggravate than to soothe the violence of the symptoms. He tore the boards with indescribable fierceness, and, getting his teeth into a crack, ripped off splinter after splinter, until he had made a hole almost large enough for his head, when he was ordered to be shot. At the moment his eyes were like balls of fire; he had broken off one of his tusks, and his mouth was spouting blood. Soon afterwards another fine animal, which seemed to be perfectly well a few moments before, suddenly sprang up, dashed off with a wild yell, wheeled round the harbour, returned to the vessel, and there fell struggling in a fit. I had him tied, but he tore himself loose, and, fearful for the other dogs, he too was killed. Three others died the same day, and the deaths during the first two weeks of December were eighteen. This, with the losses before sustained, left me with only twelve animals. One week later these were reduced to nine."

Eventually nearly all the dogs had succumbed, and this misfortune indirectly caused the death of one of Hayes' colleagues—a most promising man of science.

In the French edition of Hayes' book, published in 1872 (*La Mere Libre de Pôle*, Hachette, Paris), the editor, Belin de Launay, states that the epizooty continued up to that date, and that it prevailed from Smith's Straits to Jakobshavn.

The distress it caused in Greenland was very great, and Hayes, when speaking of an Esquimaux chief, tells us of the suffering this man and his people endured from the disease among the dogs. Indeed, it would seem that if the malady does not soon cease its ravages, the canine race will become exterminated in these inhospitable regions. And, if so, what will become of the Esquimaux? Their dogs are to them invaluable treasures, without which they have no security against want and starvation. Will they become extinct when their dogs have died? Or will they be able and willing to migrate to more genial latitudes, and change their mode of life altogether? Either Steller or Wrangell, I at this moment cannot remember which, tell us of a tribe in Northern Siberia, that from living inland as a pastoral people, had to wander to the sea-coast, and become a community of fishermen, in consequence of a deadly malady which destroyed all their reindeer.

* This is a grave error. Rabid dogs have no dread of water—rather the contrary. Hydrophobia, therefore, is an inappropriate designation.

† This is no argument for or against the disease being rabies.

Is this dog disease rabies? From the symptoms described by Kane and Hayes, there can be no doubt that if it is not that serious malady, it at least bears the closest resemblance to it. Hayes' teams were collected in districts where the scourge prevailed, and we need, therefore, be scarcely in doubt as to its contagiousness. The initial symptoms do not appear to have attracted attention, and it was only when the more violent indications appeared that the existence of the disease was noted. No measures appear to have been adopted by the Esquimaux to prevent its extension; and whether it still prevails, or ceased when it had no longer any victims, we cannot say. Immediately on Lieutenant Payer's arrival in England, I addressed him on the subject, and he courteously favoured me with the following reply:—"It has given me great pleasure to receive your query. The interest you take in so peculiar a subject as canine welfare, is only another proof of the eagerness with which practical information concerning those regions is sought in this country. With respect to the animals you mention, I have to inform you that I learnt nothing more than the account given by Kane and Hayes. From Greenland itself we had no dogs, nor did we come across any. The dogs we had were all procured in Vienna, and were Newfoundlands—they answered our purpose admirably. As to diseases, I can say nothing."

It will be perceived that Payer, by taking his sledge-dogs from Vienna, escaped the loss which befell Kane and Hayes; and it is now a matter for serious consideration whether our own exploring expedition should not obtain its canine quadrupeds from other regions than Greenland, should sledge-work be anticipated. To say nothing of the danger incurred from the presence of rabies among the dog-teams, the loss of the animals might prove a source of great embarrassment to the expedition at a critical moment, as it did in Kane and Hayes' explorations.

Whatever be determined upon, however, it is to be hoped that, if the opportunity offers, careful inquiries will be made by our expedition with regard to this malady among the Greenland dogs, as to its nature, the amount of damage it has caused, and whether it has been communicated to the human species. Comparative pathology, no less than geographical discovery, have a more or less pressing interest in a subject of this kind.—Yours, &c.,

GEORGE FLEMING.
Royal Engineers.

BROMPTON BARRACKS, CHATHAM,
January 6th, 1875.

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To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—To the critical observations of so eminent a veterinarian as Mr. Fleming, I can add nothing of any value. I will, therefore, best respond to your invitation to state what I know of the Greenland dog disease by simply giving the following extracts from my papers on the Greenland mammalia (*Proc. Zoological Society of London*, 1868, p. 348):—"When the Greenland dogs die off, the Greenlander must become extinct, more certainly even than must the 'Plain' Indian when the last buffalo is shot. It is impossible for him to drag home the seals, sharks, white whales, or narwhals, which he may have shot in the winter, at the 'strom-holes' in the ice, without his dogs; or for the wild native in the Far North to make his long migrations, with his family and household goods, from one hunting ground to another without these domestic animals of his. Yet that sad event seems to be not far distant. About fifteen years ago, a curious disease, the nature of which has puzzled veterinarians, appeared among the Arctic dogs, from high up in Smith's Sound, down the whole coast of Greenland to Jakobshavn (latitude 69° 13' N.), where the icefjord stops it from going further south; and

the Government uses every endeavour to stop its spread beyond that barrier, by preventing the native dogs, north and south, from commingling. Kane and Hayes lost most of their dogs through this disease; and at every settlement in Danish Greenland the natives are impoverished through the death of their teams. It is noticed that whenever a native loses his dogs he goes rapidly down hill in the sliding scale of Arctic respectability, becoming a sort of hanger-on of the fortunate possessor of a dog-team. During the latter portion of our stay in Jacobs-havn, scarcely a day elapsed during which some of the dogs were not ordered to be killed, on account of their having caught this fatal epidemic. The dog is seized with madness, bites at other dogs, and even at human beings. It is soon unable to swallow its food, and constipation ensues. It howls loudly during the continuance of the disease, but generally dies in the course of a day, with its teeth firmly transfixing its tongue [tetanic convulsions]. It has thus something of the nature of hydrophobia, but differs from that disease in not being communicable by bite [to human beings], though otherwise contagious among dogs. The Government [of Denmark] sent out a veterinary surgeon to investigate the nature of the distemper; but he failed to suggest any remedy, and it is now being 'stamped out' by killing the dogs whenever seized—an heroic mode of treatment, which will only be successful when the last dog becomes extinct in Greenland. Strange to say, the dogs in Kamschatka are also being decimated by a very similar disease; and in a recent communication received from that region, it is said that so scarce have dogs become, that the natives do not care to sell them, and that 100 roubles have been refused for a team of six. Fortunately for the Kamschatkans, they have the reindeer as an ulterior beast of draught and burden." Since writing the above, I have made many inquiries in regard to this dog disease of Danish officers who had arrived from Greenland, but without adding much to my previous knowledge. The disease still prevails, but has not extended—when I last heard from Greenland—south of the Icefjord of Jakobshavn. So careful were the Danes when I was in the country to prevent the dogs from Jakobshavn commingling with those of Claushavn on the other side of the Fjord—for the disease is contagious, whether the dogs are bitten or not—that during the winter, when anyone wished to cross from Jakobshavn to Claushavn, and *vice versa*, the sledge did not go the whole way, but the traveller left it a little way from the shore, after which the dogs were driven home again. Some of our dogs from Claushavn which had accidentally got ashore at Jakobshavn, were killed by order of the Governor, in case they should reach Claushavn in the winter over the ice, and spread the contagion among the then untailed dogs of that settlement. If the Arctic Expedition is determined to take dogs, I think, therefore, that they should endeavour to obtain them from uncontaminated districts—such as Egedesminde, Christianshaab, or Claushavn.

In South Greenland the natives do not use the dog sledge. It will, however, be found very difficult to obtain dogs in Greenland. The natives with more prudence than they are usually credited with, refuse to sell them; nor do I believe that the Danish Government in the interest of the natives, will be found willing to allow them to part with animals so essential to their welfare or even existence. If it had been practicable the western shores of Davis Straits, where the disease has not yet reached, would most likely be found a locality where healthy strong dogs could be more easily purchased than on the Greenland shores.

ROBERT BROWN.

January 23rd, 1875.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of January 11, 1875.

SIR RUTHERFORD ALCOCK, Vice-President, took the Chair at 8.30 P.M. A letter was read from Lieutenant-Colonel C. C. Long, Staff-officer in the Egyptian service, dated Gondokoro, 20th October, 1874, in which he gave an account of his journey to King Mtesa, on the shores of the Victoria Nyanza. He left Gondokoro on the 24th of April last, charged by Colonel Gordon with a friendly mission to Uganda, the kingdom of Mtesa, accompanied by two Egyptian soldiers, and two servants. After a journey of fifty-eight days he arrived at the richly-cultivated district of Uganda, which appeared to him like a forest of bananas. King Mtesa received him with great friendliness and pomp, and ordered thirty of his subjects to be decapitated in honour of the visit. Permission was given Colonel Long to descend Murchison Creek, and view Lake Victoria, the waters of which he sounded, and found a depth of from 25 to 35 feet. In clear weather the opposite shore was visible, and appeared to an unnautical eye from 12 to 15 miles distant. He had intended to pass from the lake *via* Ripon Falls to Urondogani, but the superstitious natives prevented him, and he was obliged to return to Mtesa. Colonel Long left for Urondogani on the 19th of July, where, after much suffering, he arrived, taking twenty days to do a three days' march, robbed of all his baggage and provisions, and deserted by his porters. Returning to Egyptian territory by water, he discovered, in latitude 1° 30' N., a large basin or lake, at least 20 to 25 miles wide. He found the Upper Nile, from Ripon Falls to Karuma Falls, a fine navigable stream, and large enough to float the 'Great Eastern.' Resuming his march northward, he arrived at Gondokoro on the 18th of October. When at Uganda he induced Mtesa to close the road to Zanzibar, and, in the interest of Egypt's monopoly of ivory, to send his ivory to Gondokoro. He finally reports that Colonel Gordon will soon have a steamer on the Albert Nyanza, and intended also to move one to the Upper Nile above Karuma.

A paper was read "On a Journey along the East Coast of Africa from Dar-el-Salam to Kilwa, in December 1873," by Captain F. Elton. A paper describing Captain Elton's journey in that region will be found in our number for August, 1874, p. 181, to which we would refer our readers.

Major ERSKINE then read a paper by his son, Mr. St. Vincent Erskine,

ON A JOURNEY TO UMZILA IN SOUTH AFRICA.

In the year 1868 Mr. St. Vincent Erskine explored the Limpopo River, from its junction with the Lupalule, or Elephant's River, to its mouth, which was found at the Inhampura of the maps, and not, as previously thought by many, the Sabia, near Inhambane. This expedition was a most extraordinary one, considering that the difficulties overcome by a mere youth had baffled the attempts of many experienced travellers, well equipped with goods, whilst Mr. Erskine had only a few beads, blankets, knives, and a little calico.

Having lost his original journal, together with his observations, in a flooded river, this paper has been written from memory, and from the notes of Mr. Dubois, who accompanied Erskine as interpreter, and who returned by sea with the ivory sent to the Natal Government by Umzila, and the heavy baggage. Such latitudes and longitudes as are given are partly from recollection, but mostly from his map, which he had on his person. Erskine tried to interest different friends in the exploration of the country between the Limpopo and

the Zambezé, so as to make another expedition; but having failed to do so, had settled down at home in despair. In August 1870 a deputation or embassy from Umzila, King of the Gosa, who rules from King George's River, at Delagoa Bay, to the Zambezé, arrived at Natal, apologizing for the ill-treatment Erskine had met with from his people on the Limpopo, and begged that he or some other person might be sent to establish friendly relations with them for trade and labour, and particularly that a ship with goods should be sent into the Limpopo, when he would "load it down" with ivory. Erskine had never ceased to regard the blank in the map north of the Limpopo as his property, and jumped at the opportunity when offered a mission by Lieutenant-Governor Keate, supplying a great portion of the goods required himself, the cost of which was afterwards paid by the Government. He sailed in a schooner in June 1871, with Mr. Robert Dubois (who had come out of the terrible Limpopo Expedition with him before), as his interpreter, and one Natal "Induna," or head man; a Zulu, and a Zulu man as servant, who spoke English, and one of Umzila's men, who had remained behind from the embassy to accompany him. On his arrival at Lorenzo Marques or Delagoa Bay, which he describes very minutely as a miserable place, owing to misgovernment and want of energy on the part of the Government and the inhabitants, who are all half-castes, he found the Governor hostile to his expedition, because hostile to the Chief Umzila, with whom his Government had been recently at war, and he therefore refused him permission to go into the interior, although he had a passport from the Portuguese Consul in Natal, marked for the interior, and letters from the Natal Government stating the object of his visit. Erskine, however, was not to be stopped in this way. He landed the bulk of his goods under Mr. Dubois, at Lorenzo Marques, as they had paid duty, and arranged with him a rendezvous on the Limpopo, proceeding himself to Inhambanè, a Portuguese settlement higher up the coast, where the Governor, thanks to M. Laforte, a French gentleman all powerful there, allowed him to proceed into the interior. The Bay of Inhambanè is surrounded by a belt of cocoa-nut trees, which grow luxuriantly, and which, if properly utilized, would produce an immense return. On the 31st of July he started for the interior, and marched 6 miles to a kraal, where he was well entertained with his party.

Proceeding through a country principally of deciduous thornless trees, with occasional umkoshle, and a sort of gutta percha, and sleeping in the open, he found plenty of water always at the huts, proceeding apparently from the Inyantombè River. The country was so flat that he attempted to get an observation for variation of the compass by amplitude. It gave 210° W. The barometric readings were lost with his journals. On the 2nd of August he reached Umzila Border, at the Inyantombè River, an affluent of the Inyanbone, which he also crossed, flowing northerly in latitude 23° 55', where he saw a creeper, which he describes as the original of Jack's bean-stalk, and which not only covered the tops of the trees like an umbrella, but also several bushes, and it was further supported by poles, until it covered 5400 square feet. Another peculiar tree, called Umtoute, was found unaccompanied by any other forest tree. It was deciduous, and apparently belonged to the leguminous order.

This was the character of the bulk of the country from Inhambanè to the Limpopo. The elevations were mere undulations, and had evidently been formed on a sea-beach by the action of the water, sometimes of mere sand, and at others from arenaceous soil of a red and more fertile description. They are universally covered by deciduous thornless trees, with but little grass, and that of a poor sort. There is no undergrowth. Patches of vegetable ivory palm fill occasionally desiccated lagoons. Several interesting spots required further investigation, especially the mouth of the Inbabalie or

Lavera River, and the mountainous region between Umzila's kraal and the Zambezé, including the auriferous region of the Manchu River. The idea occurred that as the litmus dye is produced from a tree lichen (the *orchilla*), perhaps the moss-like lichen, so profuse, might be utilized, though it is not strong enough for cordage. The natives' huts are always miles away from water, showing the great insecurity of life and property, and their clearings are at intervals along many rivulets and streams. Having reached the confluence of the Shohozoli, a large river, with the Limpopo, the bellowing of the hippopotami was instantly heard. This must have been an interesting moment when, calling to mind the desperate circumstances under which he had last seen the Limpopo, alone, fever-stricken, and with only a small piece of brass-wire left, with which to make his way back for many hundreds of miles. The valley was densely peopled when he was there in 1868; but now the population was much increased. Next day he reached Manjobos—his old enemy, Manjobo, commander-in-chief at the Bigin. Erskine sent to say that "Maskin" had arrived for the second time, and would like to see him soon. He came that night, but did not see him till morning, and then said he knew nothing of him, his mission, or of Mr. Dubois and the goods. He admitted next day that he knew of the expedition, but said he had nothing to do with it, and if it were true that Umzila wanted to be friends with the white men, he did not. Leaving on the 15th of August, he found plenty of inhabitants on the Limpopo for some distance, when the population became thinner.

The following day he met Mr. Dubois and his goods. Mr. Dubois had had a terrible time of it from want of bearers, and the troublesome navigation in canoes of the King George's River for about 70 miles. It is only about 8 miles from the sea. Though shallow at the mouth, the river appears to be deep elsewhere; hippopotami abounded, and the country was so infested with bugs and rats, that he could not sleep at night. The main stream bursts through the Bomba Mountains, and rises near Leydenburg; its chief affluents are the Salibala, on the upper waters of which are the new gold fields, the Umgerania, and the Umlumase. The King George's River is not more than 100 yards wide. All these rivers rise near Leydenburg, at about an altitude of 6000 feet. It is one of the finest and healthiest countries in the world. The coast lands drained by them are fertile, but the climate is too unhealthy for European occupation; therefore, except for depôts for goods, or for sugar or tropical produce, they will never be valuable. A small steamer from Lorenzo Marques, well supported, would find ample employment here. They now started back to Monjobos, finding the Limpopo quite unnavigable, and on arrival there spent some time in putting together his double canvas canoe, and making enquiries about his route; and he then records, for the first time, that the whole country, from the Limpopo due north to the Zambezé, was one dense bush-covered plain. Fish of various kinds abound in the Limpopo; one kind, weighing from 5 to 20 pounds, was very beautiful; it has eight teeth above and ten below, on the *outside* of the mouth, with channels cut to receive them. They now started down the Limpopo in the double canoe, described in Baines' and Lord's books, which Erskine had made under Baines' personal advice and drawings. They found the river so shallow that, although their craft drew only a few inches, they frequently ran aground. On the fourth day they met with a sad mishap: when crossing a wide reach in a breeze, the boat took in water at the junction of the deck and canvas, and, not landing soon enough to bale out, she went down. Mr. Dubois jumped overboard with his gun, but was compelled to drop it. Erskine collected his instruments, and swam to the shore with them. They lost two valuable rifles, their boat, pots, &c. Erskine dived that day and the next until quite benumbed, and severely cut with coral-rock, but could not recover anything but the

boat, which was uninjured. The Kafirs afterwards broke her in landing, so that it was not worth while to repair her, and her skeleton was left in a tree as a trophy. They now went down the river in a dug-out. They were three days going down to the sea from Manjobos, and the river was only navigable for about 60 miles. Here Erskine was attacked by fever, which had been hanging about him ever since his exposure in diving for his things.

Erskine describes most minutely the entrance to the Limpopo, with instructions to vessels entering it. There is a double bar, and the tortuous channels are always open. He had no boat with which to explore these channels, but thinks they must be from 4 to 5 fathoms deep, and the same inside for 60 miles. It is altogether a more navigable river than either the King George's or Mapoota rivers at Delagoa Bay. The latitude, as determined by Erskine from the natural horizon, in 1868, was $25^{\circ} 15' S.$; but the mist from the surf doubtless affected the result. Captain Owen's determination was $25^{\circ} 11' 6''$, a difference of 34 miles. On this occasion, the mean of several stellar and solar observations almost exactly agreed with that celebrated surveyor's determination, namely, latitude $25^{\circ} 12' S.$; the longitude was $33^{\circ} 45' E.$, disagreeing with Captain Owen's chronometric observations by $14'$ his being $33^{\circ} 31' E.$ The width at the mouth was $13\frac{1}{4}$ fathoms at high tide.

He sums up the navigation and commerce of the Limpopo thus:—It is difficult of entry; has 60 miles of navigation, 25 of which are directly inland; and it flows through a fine alluvial valley 15 miles broad. Its productions are hides, horns, native furs, gums (including copal, he believes), ground nuts, vegetable ivory, orchilla lichen, mangrove poles, perhaps a little catter (which grows wild, and is used by the natives), honey, and beeswax. Its advantages of position are its proximity to Leydenburg, in the Transvaal country, where bread-stuffs are grown, as well as wool, and which is also rich in minerals of all sorts; the distance to the new Gold Fields being 170 miles.

The disadvantages of the Limpopo are the fevers, which prevail there, and all along that coast beyond 27° of latitude, but which does not extend beyond the foot of the hills which run, more or less, near to the sea, and the vast plateaux of which are as healthy as Madeira.

Mr. Erskine describes the coast from Durban to St. Lucia Bay, or the Zulu country, as having a high ridge near the sea, backed by hills rising step by step, but from thence northward towards the Zambezé; the bush country is a sandy flat. As a rule this plain may be described as a mitigated desert. The great limestone plain of South Africa is hemmed in by mountains to the west, and it extends, by the accounts of travellers, as far as Abyssinia. The maps of this coast are entirely wrong, and many mythical mountains and streams ornamental, thus showing the necessity for an Admiralty survey of the coast. The country here is called the Dibin.

He now came to quite a different race, whose huts were of bark, and so filthy that he slept under a huge baobab-tree, which dwarfed men into mere ants. These people wore tails or stumps sticking out behind made of leather ornamented with brass. This is evidently the origin of Lord Monboddos's men with tails, which, indeed, have often been mentioned by travellers, and are constantly alluded to by the Zulu Kafirs, as well as unicorns, which are now known most certainly not to exist in the Basutu country they were supposed to inhabit. Here he overtook Mr. Dubois (whom he had sent on, nearly dead with fever), and if he had not arrived with a supply of quinine he would have died.

In latitude $22^{\circ} 16'$ he came to the large river Gabulu, called by the Portuguese Gavura. Several mythical streams are laid down here on the maps, which are all, no doubt, the Gabulu, which runs parallel to the sea, and has been touched at by traders. It runs into a bay called Masomone, north of Bazaranta Island.

The natives here described some immense caves near,

which they were too harried and disheartened and sick to visit. They said the caves were insupportably hot, and required light to visit them, and that there was a stream and pools in them—latitude $21^{\circ} 43'$, longitude $34^{\circ} 34'$. Here also they had to go twenty-four hours without water, with a long march, and the thermometer at 188° in the shade.

Next day they overtook Messrs. Beningfield and Skillbeck, who were shooting elephants, and found them in good health, and enjoying themselves *greatly*. As they wanted rest, they stayed with them some days, till they left for home at the end of March. The mornings now became so cold that they had to sleep on blankets and wear coats.

They now reached the Labi, which was inhabited by the dominant Umgonis, who had fowls and other food, and who rob the poor Tongas of everything. The bed of the Labi was 1000 feet wide, but the stream (then the dry season) only 100 feet, and 4 feet deep. They came here upon a kind host, who gave them a sheep, and offered Erskine a tusk of ivory and his daughter to wife; both of which were politely declined. Here, for the first time, their coffee was ground between stones, wooden troughs, from want of stones, having been previously used.

He was much distressed here to see the state of the little slave children (waiting no doubt, to be sold to the dealers), which he describes thus:—"We saw three or four poor little Kafirs and a lot of dogs lying in the ashes—an indistinguishable mass of flesh, or rather *bones*. They give these poor slaves *no* food. If there are any pot scrapings they get them; if not, they have only such rats and birds as they can catch."

Here they crossed the Labi in latitude $21^{\circ} 18'$: it is quite unnavigable, though its bed is a mile broad. The country was well inhabited.

They now passed through a dense bush, and then came to a fine forest, beyond which lay the largest kraal of Umzila's. There they found, as Erskine had predicted, rain and fine crops. They crossed the affluents of the great Bosi River. The path here was 1500 feet above the sea, the view from the western slope being the finest he had seen.

Having arrived near to Umzila's kraal, they sent to announce their arrival, when he replied that they were to stop where they were. Having waited a fortnight, they sent to say that unless placed nearer to him they should return home, as they were being starved there. They were, at last, allowed to come to his kraal at the sources of the Umswelisi, and called Tsamatskama or Nodwengu; Tsamatskama being its ancient Tonga name, and the latter a Zulu name, imitated from the name of the kraal of Umpanda, King of the Zulus. They halted within 500 yards of the King's kraal on the 8th of April 1872, having started from Natal on the 25th of June 1871; all those months having been wasted chiefly by the ignorant opposition of the Portuguese Governor at Delagoa Bay, and the rest by the want of bearers, owing to the disobedience of the tribes supposed to be under Umzila. The latitude of Umzila's kraal is latitude $20^{\circ} 23'$ S.; longitude by dead reckoning, $32^{\circ} 30'$ E.; elevation, by barometer and boiling-point, 3200 feet above the sea.

Long weeks were now passed in idleness, as sport was not possible, on account of the grass which was high overhead, and the buffaloes formerly wounded being dangerous. To pass the time they made an excursion to the Tongo Mountains without guides, as they could get none; breaking their way through the tall grass, and then following buffalo paths. There Erskine found a splendid site for a township. They heard here some vague rumours of ruins, but the moment inquiries were made, the narrators "shut up," being aware that they were on forbidden ground. Erskine thinks there can be but little doubt that ancient Muhammadan ruins exist between this and the Gorongosi of the old Monomotana (or Children of the Mines) people.

To say that this piece of country is full of interest is but expressing a tame opinion of its geographical and geological features. This basin of mountains is the source of the great Bosi, one of the most interesting problems of geography. By its exploration, a knowledge would be obtained of vast regions of healthy country closely adjoining the Port of Sofala, and if taken on hand by Portugal and offered to emigrants on a liberal scale, it would immediately solve for ever the native difficulty in Southern Mozambique, and form a source of wealth and commercial activity such as she has not known since the days of those heroes who gained for her a grand colonial empire, of which the fragment alone remains to her now.

Erskine slept at the foot of the great Shinanimane Mountain, which rises from the plain 3200 feet in a sheer wall on the Elarone River, in latitude $19^{\circ} 50'$. This can be marked as his furthest point in 1872. He found his friend's cattle, the sea-cows, and had a fine shot at 20 yards at one, but did not bag any. He made Umzila's easily in four days from this magnificent and valuable country.

In returning they came to his old point of what he called the "meeting of the waters," that is, of the Lupalulé or Elephant's River and the Limpopo, and found the latitude to be $24^{\circ} 8'$, being 34 miles more to the south than his observation in 1868, the error in which he explains as having been caused by erroneous reading. The longitude he now changed also (in consequence of that of Leydenburg being changed) from $33^{\circ} 42'$ E. to $33^{\circ} 2'$.

On his return he unfortunately lost his journals. He had carried them the whole way on his person, but the rivers in Natal being up, and having to swim, some of them on horseback, he was persuaded to put them into a waggon, where they were lost. He had hardly rested and realised his loss, when he started again back to Umzila's *via* Sofala, this time on "his own hook," and amply supplied with goods by Messrs. Dunlop, Mees, and Co., of Rotterdam, which eminent and enterprising firm has been occupied for some years past in developing the trade on this coast regardless of expense. The journal of this fresh expedition, in which he had 40 hunters and 160 bearers starting from Sofala, promises to be of great interest, and, as he had proper instruments and more experience, will be very valuable. Since his return by sea from the last expedition, he has started again from the same region a fourth time, but finding trade brisk at Delagoa Bay has remained there for the present, sending out hunters to shoot ivory.

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FRENCH GEOGRAPHICAL SOCIETY.

THE second annual meeting of the Society, held during the year 1874, took place on the 16th of December, and notwithstanding the unfavourable weather a large number of members were present.

After the President, Admiral de la Roncière Le Noury, had opened the proceedings, and M. Delesse had read out the names of a few of the new members, the general secretary, M. Maunoir, read his *résumé** of the geographical events of the year. Before touching upon these, however, he announced that the library had been enriched by the accession of 400 volumes and 100 maps, during the year under review, which raised the total number of books and maps to upwards of 10,000, and

* A writer in the *Journal Official* remarks that these *résumés*, forming, as they do in each case, a complete index to all geographical events of the year, should be bound up together for reference. He also observes that complete sets of the *Bulletin* (which gives certain papers of interest in detail) are, unfortunately, extremely rare. His last suggestion appears a valuable one, *i.e.* that papers read at the meetings should be printed and circulated among members on the following day, at the latest.

nearly 5000 respectively. The finances were tolerably satisfactory, and the Society had voted a sum of 400*l.* towards the approaching Geographical Congress. It was a matter of regret, however, that more money could not be spared for assisting travellers, and subscriptions to this end are much needed.

M. MAUNOIR then referred to the hydrographical labours of the past year. M. Manen had surveyed the course of the Gironde; endeavours had been made to improve the harbours of Boulogne and Cette; while abroad Messrs. Hérand and Bouillet had examined the chief places along the coast of Tongkin, and M. Hanusse the port of Sebanilla in the Antilles. The Marine Department had published 109 charts, and the War Department had shown activity in determining the new meridian of France, between the Department of Allier and the Pyrenees, and in ascertaining the difference of longitude between Marseilles and Algiers. The large official map of France, on the scale of 1:80,000, or about one and a quarter mile to the inch, is nearly completed; two sheets pertaining to France, and five to Corsica alone remaining unpublished. A map of the French Alps, a coloured map of France on the scale of 1:320,000, and a new one in six sheets, are also in hand, while the same Department has been engaged on maps of the Rhine, Algeria, Mexico and Syria. Among private productions the relief maps of Mlle. Kleinhans, and an agricultural map of France by M. Delesse, deserve notice. Three societies were founded in 1874, not including the central commission of commercial geography, viz., the Geographical Society of Lyons, the Society of Commercial Geography at Bordeaux, and the French Alpine Club. The following French travellers had died during the year 1874:—Garnier, Dourdeaux, Dupéré and Joubert, Captains Fau and Moreau.

M. Maunoir then proceeded to enumerate the chief doings of importance during the past year, and among them announced that Captains Roudouri and Parizot, and Messrs. H. Duveyrier and La Chatelier, mining engineer, had undertaken a series of investigations in order to ascertain if it were possible to create an inland sea in Algeria. He also stated that Messrs. Guierre and Bellot proposed to represent France in the approaching English Arctic Expedition, M. Largeau would explore that portion of the Sahara first touched by M. Dourneaux, M. Savorgnan de Brazza, a naval officer, would endeavour to follow up the route of Messrs. Marche and De Compiègne, and Dr. Harmand, the discoveries of the French Expedition up the Mekong, and of M. Dupuis in Tongkin, and the researches of M. Delaporte in and about the ruins of Angkor. By far the greater number, however, of the events touched upon by M. Maunoir have been duly chronicled in our columns, and therefore need no second notice. The meeting then broke up.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

THE Society held its monthly meeting on the 4th (16th) of December, M. P. Semenov, Vice-president, being in the chair. H.I.H. the Grand Duke Constantine Nicolaivitch was present, and the proceedings opened with the usual monthly report from the Secretary.

M. WILSON drew attention, amongst other objects presented to the Society, to a description of the Amu Daria country, several Oriental manuscripts, &c., the gift of Prince Riza-Kouli-Mirza, who, in the capacity of aide-de-camp, took part for a time in the recent expedition. He also announced that M. Glukhovsky had presented certain collections of herbs and insects, made by M. Ogorodnikof, who had been attached to the caravan recently despatched towards Afghanistan. The disturbed state of the latter country prevented the caravan from entering it, and all operations were confined to the northern frontiers of Persia. M. Glukhovsky also purposed to present a collection embracing ancient

coins, Turkmen songs, a variety of seeds of several useful plants, and specimens of metals and minerals.

In November a detailed report reached the Society from M. Chekanofsky, on the Olenek expedition, in Northern Siberia (the previous history of which we have already noticed, see p. 215 of our August, 1874, number). The report is dated July the 2nd, from the confluence of the Olenek and Tomba (67° 18' N. latitude). The travellers, Messrs. Chekanofsky and Muller, accompanied by a Cossack, fifteen men and 150 reindeer, started from Erbokhogon (61° 16' N. latitude) at the beginning of March, and proceeded along the valley of the Lower Tunguska, but the depth of the snow and the severity of the cold, which reached as low as 45° Centigrade below zero, necessitated frequent halts. On the 12th of March the expedition arrived at the confluence of the Kopokit and Olenek Rivers, and ascending the course of the former, they reached the water-parting of the Lower Tunguska and the Vilni, whence, travelling in a north-westerly direction, they descended into the valley of the Vava, and crossed the massive and bluff mountain chain of Anaon. Here they hoped to come across some natives who would show them how to regain the Olenek River, but although traces of habitations existed, no inhabitants were met. Fortunately two of their Tungoose guides agreed to accompany them further north, and three days later, on the 27th of April, when in latitude 66° 26' 30" N., they came upon a large stream, which they presumed to be the Olenek. A boat was built, and an attempt made thus to travel down stream, but the melting of the snows had swollen the waters so that the party were glad to land again. An old Tungoose was then met who informed them that this was the Moniero, and not the Olenek River, and that the latter lay some distance to the north-east. Following his instructions they struck off in that direction, and on the 28th of June reached the Olenek at its confluence with the Tomba, in 66° 18' N. latitude. M. Chekanofsky also furnished details regarding the geological and botanical collections and observations he had made, and the astronomical, magnetical, and meteorological observations of M. Muller.

The Secretary announced that the Russian Committee which had been formed to co-operate with the Paris Geographical Congress, had drawn up a programme of operations. They did not propose to go beyond the consideration of cartographical apparatus and works on geography, although the Paris body contemplated the discussion of ethnography, fisheries, minerals, &c., but these subjects the Russians considered had been sufficiently represented at the Moscow and Vienna Exhibitions.

An abstract of Major Wood's paper on the Lower Oxus was then read, and excited much attention. The gallant major pointed out that much more water is drained off than is needed for local requirements, and the balance is wasted, owing to the defective system of irrigation. To the same cause must be attributed the creation of shallows and sandbanks, which gradually accumulated to such a degree as to obstruct the river's westward course into the Caspian, and so forced it to seek another and a lower declivity into the Aral Sea.

M. WILSON read a memorandum on the populations of St. Petersburg and Berlin according to the Censuses of 1869 and 1867 respectively. From the figures of these it appeared that in the former city those dependent for their livelihood on the earnings of the head of the family, form about one-third of the population, and in the latter about one-half. The number of servants, on the other hand, is very nearly twice as great in St. Petersburg as it is in Berlin. The number of women and children employed in the first-named city is much greater than in the second, although, in Berlin, there is a larger proportion of young children employed.

After the election of several new members, the meeting broke up.

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THE
GEOGRAPHICAL MAGAZINE.

MARCH, 1875.

THE WORK OF THE ARCTIC EXPEDITION.

FORMERLY exploration in the Arctic Regions was entirely performed by ships. On one or two occasions only were sledge parties despatched for the purpose of discovery, and then on a very reduced scale. During the search expeditions, however, after Sir John Franklin and his gallant companions, the system of sledge travelling was matured, and has now, owing to the genius of M'Clintock, Mecham, Hamilton, Osborn, and Richards, reached a high state of perfection. In fact, in these days the sledge must be regarded as *the* principal means of Arctic exploration, and the ship only as the auxiliary. It is to Sir Edward Parry that the introduction of sledge travelling is due, but the very primitive and cumbrous machines used by him during his many successful voyages to the Arctic Regions, are no more to be compared with the light and useful sledges which are being constructed from the designs of Sir L. M'Clintock for the expedition of 1875, than is a brewer's dray to a light gig. We propose to institute a comparison between the modes of travelling past and present; and to describe the work that will fall to the lot of an exploring expedition during the space of twelve months. The best route for Polar exploration is the one that has been so unanimously advocated by all Arctic authorities both of our own and other countries, and the one that is to be adopted by the expedition about to leave our shores. There are many reasons why the route *viâ* Smith Sound is superior to and more advantageous for polar exploration than any other. We know that the United States exploring ship 'Polaris' succeeded by this route in reaching a very high northern latitude,—in fact, the highest latitude that a ship has ever attained, and that in a remarkably short space of time and with perfect ease. The shores of this narrow sound are teeming with animal life. In Dr. Hayes's expedition upwards of 200 reindeer were shot during the winter, walrus and seals were abundant, and there were quantities of ducks and little auks in the summer. Where the 'Polaris' wintered herds of musk oxen found pasture, rabbits abounded, and large flocks of birds came northward in the summer months. This in itself is of the utmost importance, as with well-organized hunting parties, such as will be formed on board our exploring ships, the crews will be supplied with fresh meat. The Smith Sound route is the best adapted for exploration by sledges, and in case of mishap or any unforeseen accident befalling the ships, it would simply be a matter of time for the ship's com-

panies to travel south and reach the Danish settlements, or one of the Scotch whalers that annually frequent Baffin's Bay. The importance of reaching in the ships a high latitude lies in the consideration that every 10 miles made good in the ship towards the north, is two days' sledge travelling saved. The ships ought to leave England in the month of May or June. In a fortnight Cape Farewell, the south extreme of Greenland, would be reached, off which the first ice is invariably met. This in a great measure consists of small detached fragments, probably broken off the land-ice, with which Greenland at the early part of the year is surrounded, by the motion of the waves. Icebergs are also fallen in with in this locality. The scene on a fine clear day in Davis' Straits, to one visiting these regions for the first time, is indeed very grand. Huge icebergs sailing majestically along, in every conceivable shape and form, at times making the navigation so intricate as to call forth the utmost vigilance and watchfulness from those on board, their edges adorned with pendant fringes of icicles, whilst the bright blue and green tints reflected from these huge mountains of ice tend to render it a scene such as is hardly to be realised by those who have never witnessed it. The Danish settlement of Lievely, or Godhavn, at the southwest extreme of the island of Disco, and Upernavik, the most northern settlement, are reached, dogs are purchased and taken on board, Esquimaux dog-drivers engaged, and the necessary skins and dog food procured.

Now commences the first really serious work of the exploring ships. One day's run from Upernavik and Cape Shackleton is reached, from which is sighted the dreaded floe ice of Melville Bay, a spot which, until the introduction of steam, has proved fatal to many a gallant bark. To an inexperienced eye this ice seems of an impassable and impenetrable nature, but to those acquainted with ice navigation a lead may appear through which the ship is steered. Much depends on the wind in making a passage through Melville Bay. If it is calm, or if the wind is from the north, the ice loosens, and ships must then make the best of their time and push on speedily; but if the wind is from the south it causes the loose ice-floes of Baffin's Bay to pack against the land or fixed ice, and woe betide the unfortunate vessel that should be nipped between the two. The only means of escaping destruction is by cutting a dock in the land-ice and warping the ship into it. Steam, however, has of late years produced such a revolution in ice navigation, that the animated scene of 200 or 300 seamen landed on the floe, busily employed in the operation of cutting

docks, is now seldom or ever witnessed. The last English Government Expedition, that of Sir Edward Belcher, took no less than five weeks going through Melville Bay, although the expedition was accompanied by a couple of steam tenders, commanded by experienced and energetic officers. When Commander Markham went through Melville Bay in 1873, in the steam whaler 'Arctic,' the time occupied was only sixty hours, and last year the whole of the whaling fleet succeeded in making the passage in three days! Such is the advantage we have gained by the aid of steam. Detention in Melville Bay is, even with a steamer, probable, but seldom for a long duration. When such is the case, ice-anchors are got out, and the ship is moored to the floe, waiting an opportunity for the ice to ease off. Perhaps it is only a neck of ice that prevents the ship from proceeding; in which case, with a full head of steam, the objectionable barrier is rammed, and the ship is forced through, emerging into the open water beyond. Even during these detentions the time may be beguiled in shooting looms and rotges, which are capital eating, harpooning narwhals and stalking seals, or in the more exciting sport of bear hunting. Sport, together with the strange and novel scenery, and the beauties of the midnight sun, make life, even in Melville Bay, charming and enjoyable. In former days the monotony of the detention in this bay was indeed wearisome, and the laborious work of tracking the clumsy, unwieldy ship, or cutting docks in the floe, was fatiguing and irksome in the extreme.

In the latitude of Cape York the "North Water" is generally reached, and this, so far as we know, has always been navigable to the entrance of Smith's Sound, and to a much higher latitude.

We will now assume that the month of September has arrived, and that the expedition has succeeded in reaching, we will say by way of illustration, the latitude of 84°. We are, of course, anticipating an open season, and a most favourable and prosperous run. Bay or pancake ice, which is newly-formed ice, is now forming, and it is absolutely necessary to seek winter quarters. A snug harbour is, if possible, found, protected as much as possible from the prevailing N.E. winds, and arrangements are at once commenced for securing and housing-in the ship. One part of the ship's company is told off for this latter duty, which consists in unbending the sails, unreeving running rigging, sending down upper spars, and housing the ship in with a covering made of tilt cloth. This is spread on spars that are secured fore and aft between the masts about 15 feet above the deck, sloping down to the bows and the stern, and ridge-ropes set up to the rigging, about 7 feet above the bulwarks. One entry only is made as a gangway, on what would be the lee side of the prevailing wind. An observatory is built, and an ice wall made to enclose the ship, the space inside the wall being kept free and clear, to be used for exercise, and as a promenade during the winter months. In the meantime, the other part of the ship's company will be preparing the sledges, and making the necessary preparations for the autumn sledge travelling, all of which will have been carefully organized beforehand.

We now come to the most important feature of Arctic work, namely, the sledge travelling, which was first introduced by the late Admiral Sir Edward Parry, but

which is most indissolubly associated with the name of M'Clintock, whose perseverance and energy have brought this system of travelling to such a state of perfection that we rely chiefly on its aid to procure for the forthcoming expedition that success which all England heartily and eagerly desires, and hopefully anticipates. Before describing the arrangements for the autumn travelling, let us take a brief retrospect of the sledging undertaken by Parry fifty-five years ago.

Parry at Melville Island, in 1820, did not commence travelling operations until June. He used a cart, in all probability formed of the field-piece carriage and limber supplied to the ship. He was away only fourteen days, having traversed a distance of about 180 miles, averaging 12' per diem. His party consisted of twelve, including himself, out of which five were officers. On account of the excessive glare caused by the sun on the snow and ice, the party travelled during the night, when the sun was low. By this arrangement they had the advantage also of sleeping during the comparative warmth of the day. The daily allowance of provisions per man was 1 lb. of biscuit, $\frac{3}{4}$ lb. of preserved meat, 1 oz. of sugar, and $\frac{1}{2}$ pint of spirits. The total weight carried on the cart was 800 lbs., consisting of two blanket tents, wood for fuel, three weeks' provisions, cooking apparatus, three guns, and ammunition. In addition to this, each man had to carry a blanket-bag, a haversack with one pair of shoes, one pair of stockings, and a flannel shirt, weighing from 18 to 24 lbs. Their tents were made of blankets, with two boarding pikes fixed across at each end, and a ridge-rope along the top, the lower parts of the blankets being kept down by placing stones on them.

In his attempt to reach the Pole, in 1827, Parry started in the same month of June, with four officers and twenty-four men, with seventy-one days' provisions, in two flat-bottomed boats named the 'Enterprise' and 'Endeavour,' so constructed that they could be used as sledges, and drawn on the ice. They were 20 feet long, and 7 feet broad, with a bamboo mast 19 feet long, a tanned duck-sail, steer-oar, fourteen paddles, a sprit and boat-hook. Each boat with stores, &c., complete, weighed 3753 lbs., making the weight for each man to drag 268 lbs. in addition to four light sledges, weighing 26 lbs. each. The boats were squarely built, without regard to shape or symmetry, their beam carried well forward and aft. In order to secure elasticity during the rough handling which they must needs encounter from frequent concussions with the ice, their frame was first covered with a waterproof coating, consisting of tarred canvas, then a thin fir planking, which latter was covered with felt, and outside a thin oak planking, the whole secured to the timbers of the boat by iron screws. On either side of the keel was a stout wooden runner, shod with metal, similar to that of a sledge, on which the boat would travel when being dragged over the ice. A spar, made of hide, was secured across the fore end of the runners, to which the drag-ropes were attached. The daily allowance of provisions for each man was 10 oz. of biscuit, 9 oz. of pemmican, 1 oz. of cocoa-powder, and 1 gill of rum, besides 3 oz. of tobacco per man per week. The fuel used was spirits of wine, of which 2 pints were used daily.

This was one of the most laborious and heart-breaking journeys that can be conceived, as owing to

the lateness of the season, the travelling was chiefly over loose pack, which on account of unusual heavy rain was broken and rotten; added to this, the hummocky nature of the firmer ice necessitated a constant packing and unpacking of their sledges, the same ground having to be traversed as many as three and sometimes four times. Parry nobly persevered, fighting against obstacles that would have daunted and appalled many a brave man, until it was known that the drift of the ice on which they were travelling was faster to the southward than the progress they were making to the northward, and they were in consequence reluctantly compelled to abandon their project and return to their ship, which they succeeded in reaching after an absence of sixty-one days. Although before turning back the party had travelled over 292 miles of ground, their greatest distance from the ship was only 172 miles, so much had the set drifted them to the southward. Notwithstanding these obstacles, and the enormous weight which each man had to drag, the latitude attained by Parry on this occasion has never been reached by known man. The experience gained during this enterprise has shown us a great deal. It proved that the allowance of provisions for the amount of work required, and for the hardships endured was insufficient. That the sledges were too cumbersome and heavy, and the weight that each man was required to drag was far in excess of their capabilities, and that the season was so far advanced as to cause not only the ice to be broken up, and thereby affected by the current, but the mild temperature had so rotted and thawed the surface of the floes on which they travelled, that the greater part of their journey was performed walking through sludge and water. As during his former sledge journey in 1820, Parry preferred travelling by night, and resting during the glare and warmth of the midday sun.

The next authentic accounts of sledge travelling we hear of are those parties organised by Sir James Ross in 1849 for the relief of Sir John Franklin, in which Sir Leopold M'Clintock, then a lieutenant, received his first initiation in that important branch of Arctic work, which through his means has reached such an admirable state of perfection. But to what consequences did these pioneer expeditions lead? Experience had to be gained, and the privations and sufferings endured by those engaged in these early expeditions are now compensated by the lessons they have taught us. They started with two sledges, each drawn by six men, carrying with them their tent and thirty days' provisions. Other parties with more provisions followed on their route. They were away forty days, having accomplished a search over 500 miles of unknown country, but we are told that out of the twelve men that started, seven only returned in comparative health, the remaining five having quite broken down under fatigue. The party suffered severely from hunger, frost-bites, blistered feet, and rheumatic pains, caused by their continually walking through water on the ice and deep soft snow. Two of them, being unable to walk, were brought back on the sledges. Sir Leopold himself acknowledges that after his return to the ship, he did not lose the sensation of *constant hunger* for nearly a fortnight.

During the next expedition, that of Captain Austin, in 1851, from the experience which he had already

gained in sledge travelling, Sir Leopold M'Clintock, by adopting a system of fatigue parties, was enabled to prolong his absence from the ship to eighty days, and to extend his journey to a distance of 900 miles. During this journey, partly travelling over the same ground as Sir Edward Parry, he discovered the encampment of his predecessor, and found the remains of his broken cart, and the records left by him thirty years before. Even the remains of Parry's last feast, "a sumptuous meal of ptarmigan," lay strewed about in the shape of bones, by no means decayed, but merely bleached from exposure. M'Clintock and his gallant party returned to their ship after this long absence, reduced a little in flesh, but *not* in health or spirits. They had already benefitted from the experience of former expeditions.

During the expedition of 1852, the last despatched by Government in search of our missing countrymen, we find Sir Leopold M'Clintock in command of the steam-tender 'Intrepid,' acting under the orders of Captain Kellett. On this occasion, Sir Leopold had, through the assiduous and constant exercise of his inventive talent, so improved on his former knowledge of sledge travelling, that he was enabled to remain away from his ship for a period of 105 days, during which time he travelled over no less than 1400 statute miles, and this, too, under no very favourable circumstances, as the ice over which he had to journey was old and unusually rugged, snow lay very deep, and Melville Island had to be crossed and recrossed, in addition to which, owing to the few men from which he had to select his party, he was obliged to portion out to each man a much heavier load than had ever been attempted before. They were most fortunate in obtaining plenty of game. Musk oxen, deer and ptarmigan were seen in abundance, and many shot, the fresh meat from which materially assisted in the preservation of the health of the party.

The words of Sir Leopold M'Clintock are very true, and very significant, in epitomizing the results of Arctic ice travel. He says:—"Truly may we Arctic explorers exclaim—'Knowledge is power!' It is now a comparatively easy matter to start with six or eight men, and a sledge laden with six or seven weeks' provisions, and to travel some 600 miles across desert wastes, and frozen seas, from which no sustenance can be obtained. There is *now* no known position, however remote, that a well-equipped crew could not effect their escape from by their own unaided efforts. We *felt* this, and by our experience, gained in a cause more glorious than ever man embarked in, have secured to all future Arctic explorers a plan by which they may rejoin their fellow men."

Before detailing the operations connected with the autumn sledge travelling, it will be necessary to explain the construction of the sledge, and the amount of provisions and stores that will be required for an extended journey. We propose, therefore, to give an account of an eight-man sledge, provisioned and stored for a period of eight weeks, copied from Sir Leopold M'Clintock's notes. The following particulars describe, with considerable exactness, the equipment which is now being prepared in Portsmouth Dockyard for use in the forthcoming Arctic Expedition:—

The sledges are made of American elm, and the runners are shod with steel. The cross-bars are lashed to the bearers with strips of hide, which are well

soaked in hot water and put on whilst warm and wet, so that when cold they will shrink tightly into their places.

The drag-ropes should be of 2-inch whale-line, or better still of hemp or manilla rope, which is lighter, six fathoms in length, and these could also be used for tent-ropes. They should be middled and the bight toggled to the span on the fore end of the sledge. The span should be of the same size and description of rope, fitted to go with an eye over the end of the horn at the after-end of the sledge, rove through one or more grumets on the cross-bars, through a hide-strop round the runner, and taken well down below the foremost horns, so as to keep it as near as possible to the best angle of traction, namely 15° . The bight of the span should be about 3 feet in front of the sledge, having a toggle and eye in the middle for the purpose of connecting the drag-ropes. To keep the contents from falling down between the cross-bars, two fore and aft lines are clove hitched round each and stretched taut along—over these is laced a width of stout canvas, on which rests the sledge trough or load, and is called the sledge bottom. The sledge trough, although not absolutely necessary, is extremely useful, as it enables the sledge to be loaded more speedily, and prevents small packages from tumbling out; it is also most useful in the event of much wet. It is simply a canvas body in which the stores are packed, and weighs, without being oiled, 8 lbs.

The drag-belts are made of light loose girth, 3 inches wide, long enough to go over a man's shoulder, having a strong eyelet-hole worked in each end, into which is spliced a piece of 1-inch rope, having a thimble on it. Round this thimble is spliced a small piece of rope, having at its other end a bung toggle, usually a circular piece of copper. This is attached to the drag-rope after the manner of a Blackwall hitch, the advantage being that the man can detach himself at any instant. Turk's-heads worked on the drag-ropes point out where the men are to attach themselves. The sledge lashings consist of about 20 fathoms of $1\frac{1}{4}$ -inch untarred rope, and is used for lashing the lading on the sledge.

Too much care cannot be taken in the stowage and lashing of the sledge. The greatest weight should be over the centre cross-bar, diminishing towards the end, so that the sledge will rise easily and gradually, and descend in the same manner, when travelling over rough or hummocky ice. A well packed, that is, a well-trimmed sledge is dragged with less exertion, and less jerking to the men's shoulders, when going over rough ice, than one that has been carelessly packed. The lashings should be passed so tight that, should the sledge be upset and roll over, its contents would remain intact. It will be found convenient to fit a light cross-bar across each end of the sledge, for the purpose of spreading a light netting, on which to stand the cooking utensils, as they are usually the last things to go on the sledge, and the first things to come off it.

Dog-sledges are of a smaller size, and the different fittings and gear are therefore proportionately small. The driver in a packed sledge usually walks behind, holding on to the back of the sledge with one hand whilst with the other he uses the whip, which latter has to be kept in constant use.

A most important auxiliary in sledge travelling, and

one which must not be omitted, is the sledge sail; by its aid, with a fair wind, the men are greatly relieved in their laborious work of dragging. The mast is extemporised out of two tent-poles—which should, if possible, be of bamboo—used as sheers, the heads being connected by an iron band, on which is stropped the block through which the halliards are rove; the heels of the sheers are stepped into a thimble on each side of the sailing thwart, which is placed across the sledge on top of everything, immediately over the midship upright, and is lashed down to the bearers. The object of having it so high is that a loftier sail may be spread. The tent-ropes are used as guys, and a hand lead-line as halliards.

Each sledge should have what is called a "store-bag," made of light duck, and containing sail and sewing needles, a palm, twine, thread, a ball of spun-yarn, 2 yards of green or blue crape, awls, waxed ends, lucifer matches, record cases, tent brush, clothes brush, and spare wicks for cooking-lamps.

With an eight-man sledge detached for an extended journey of seven weeks the total weight of the laden sledge would be 1646 lbs., being 235 lbs. for each of the seven men to drag. If *all* the circumstances are favourable, Sir Leopold M'Clintock is of opinion that this is not too much; of course the men must be picked and well trained to sledge-work before setting out. Under no circumstances should this weight be exceeded, or even maintained for more than a very few days. When sledges are travelling in company, one gun each and much less ammunition will suffice. The sledges being prepared and everything in readiness for a start, the men are assembled dressed in the following manner:—

	Spare.
1 Flannel or wove woollen frock.	
1 Thick Guernsey frock.	
1 Loose serge or cloth frock	1
1 Pair of good duffle (or box cloth lined with flannel) trowsers.	
1 Light close duck jumper and trowsers as "overalls."	
1 Pair of worsted stockings	1
1 Pair of wove woollen drawers	1
1 Pair of blanket feet wrappers	2
1 Pair of wadmill boot hose	1
1 Pair of mocassins	3
1 Pair of mitts	2
1 Welsh wig	1
1 Cap, veil and face cover.	
1 Comforter.	
1 Pair of coloured spectacles.	
1 Pair of canvas boots	2

Towel and soap, also a water-bottle and gutta-percha drinking-cup. Spare clothing in knapsack, altogether weighing 12 lbs.

The clothing supplied by Government to the various search expeditions was made of the most superior material, and was found excellent. It is hardly necessary to describe the different articles. Particular care should be exercised in the selection of underclothing which should be of the best and warmest substance. Outside clothing should fit loosely. In place of the overall jumper and trowsers, which are used merely as "snow repellents" to keep out the light snow-drift, a suit made from the skin of the moose-deer well smoked would be found advantageous; the jumper should have a hood to pull up over one's cap in bad weather, and should have a large pocket in front to put one's mitts in when not in use. The mocassins should be made large, so as on no account to cramp

the foot. They are only intended to be worn during extreme cold.

The daily allowance of provisions for those engaged in sledge travelling is as follows:—For each man, 1 lb. pemmican, $\frac{1}{4}$ lb. boiled pork, 14 ozs. biscuit, 2 ozs. preserved potatoes, $1\frac{1}{2}$ oz. prepared chocolate, $\frac{1}{2}$ oz. tea and sugar, 1 oz. concentrated rum; 4 ozs. fuel being used daily for each individual; also a weekly allowance per man of $1\frac{3}{4}$ oz. salt, $\frac{1}{4}$ oz. pepper, 1 oz. curry or onion powder, and 3 ozs. tobacco, making a weekly allowance per man of 19 lbs. 3 ozs., which is a very liberal one, and well adapted to long journeys in the most severe weather. In fact, at first starting, the men are not able to consume the full amount allowed of pemmican, but after a few days' hard work and exposure this little difficulty is soon overcome. Fuel may consist of different materials. There is the camphorated spirits of wine, whose great charm consists in its being camphorated, and, therefore, cannot well be tampered with by the men. Methylated spirits of wine has also been much used, and is cheaper than pure alcohol. Sir Leopold M'Clintock, in the 'Fox,' used crude cocoa-nut oil, which he found very useful and very cheap. Its advantages over tallow are—1st. That it cooks much more rapidly; 2nd. It makes very little smoke (an important item); and 3rd. There is nothing disagreeable in smell or taste about it.

Great care must be taken in the stowage of provisions, and, in fact, in all that relates to the equipment of a sledge, as it is most important that the greatest economy in the matter of weights should be arrived at. The officer conducting the sledge party is, of course, responsible that the necessary instruments are taken that will be required for fixing astronomically different positions, and for delineating the coast line. Everything being in readiness for a start, the sledges, which we will say are six in number, with their distinguishing flags (to each of which there is usually a history attached) fluttering bravely in the breeze, are drawn up outside the ship, the men, cheerful and joyous, with their drag-ropes in hand, the officers with their rifles slung across their shoulders, receiving their parting instructions, all hopefully confident of success, and all eager to accomplish all that man can do. It is an animated scene, all are merry and glad, with the exception, perhaps, of those few that must of necessity remain behind, to look after the ship. The crews of each sledge consist of an officer and seven men, and by a system which has already been adopted with great success on previous occasions, one sledge could be advanced to at least fifty days' journey from the ship, or more correctly twenty-five days out, and depôts placed for the return journey. This is effected in the following manner:—After travelling in company for a week, No. 6 sledge will complete the remainder to their full amount of fifty days' provisions and return, the remaining five proceeding on their way. When six more days have elapsed, No. 5 sledge will return to the ship, having filled up the remaining four to what they originally started with, and so on until No. 1 sledge is left to proceed by itself. In the meantime the sledges that have returned will immediately re-provision, and will lay out depôts for the use of, and meet the returning sledges, ready to render any assistance they may require.

As an outline of the daily routine observed by sledge parties during their arduous employment may be of interest, we will briefly refer to it. As it may be advisable some time to travel during the night, for the same reason that Parry did, we will not name any hour, but merely the time of rising and going to bed. We will begin with the commencement of the day's work. The first thing to be done is to awaken the cook of the day, who at once sets to work to prepare breakfast. The time occupied in preparing this meal is usually about an hour from the time he is called. When nearly ready, he brushes off the condensation that has taken place during the night, from off the coverlet, and from the inside of the tent, and then arouses the whole party. If the weather is very severe they sit up for breakfast in their bags, but if not, they roll them up, as also the tent robes, put on their mocassins, &c., ready for the march, and then, sitting on their bags and knapsacks, discuss their morning meal. The sleeping-bag is, as its name designates, a large bag made of the Hudson's Bay 3-point blanket or of duffle. It is about 7 feet long, and is best fitted with the opening in the side instead of at the top, as in this way it is more convenient to get into and out of, and the more readily enables a man to sit up and keep it over his head whilst eating his meals or whilst writing.

When breakfast is finished, the biscuit and pork to be used for lunch should be measured out, and placed in the luncheon haversack; dilute the day's allowance of rum, and any water that may be remaining put into the men's water bottles. Issue to the cook the day's allowance of stearine, and put the requisite amount of spirits of wine into the lamp. The cook trims both lamps, and is then relieved by the cook whose turn it is for the next twenty-four hours. In large parties it would be as well to have a cook's mate in addition, who would succeed the cook when his term of office had expired, a fresh hand being installed in the capacity of cook's mate. The whole of the tent furniture must be well brushed, so as to get rid of any snow drift, or condensation, and the tent itself should be well shaken before being stowed on the sledge, which is then packed, and the march begun. The officer takes his observations for time or variation, also the bearings of land, temperature, &c., at a regular time before starting.

After marching for about six hours, halt for twenty minutes for lunch. The spirit lamp is used to dissolve snow, and the grog, pork, and biscuit are issued. If the wind is fresh, turn the sledge at right angles to it, and with sledge sail to form a lee sit down. If very severe weather pitch the tent, and sit inside without any tent gear, or stop only five minutes for grog and biscuit. When halted for the night, and the tent is pitched, one man, after brushing himself well, goes inside, and receives and places all the gear, robes, knapsacks, sleeping bags, &c. The cook prepares supper without delay. When all the work is completed the men take off and hang up their mocassins or boots and blanket wrappers, either upon the tent ropes outside, or on the tent line inside, according to the weather, brush themselves well, divest themselves of their overalls, and take up their respective places in the tent, the officer always at the head of the tent, the cook and cook's mate nearest the entrance, so that their rising does not disturb the rest.

Supper consists of warm pemmican, the quantity in each pannikin always being carefully equalised, before being served out, then a drink of tea or water, when pipes are lighted and the party compose themselves for their night's rest; songs and yarns, if not too cold and exhausted, bringing the day's proceedings to a close. The officer, as a rule, takes his observations whilst supper is being prepared, and before lying down winds up his chronometer and writes his journal. A very good rule is to give directions, for precaution's sake, that the tent robe is never to be spread until the question has been asked, "Has the chronometer been wound up?" Before retiring, the cook sees everything in readiness for the morrow's breakfast; the captain of the sledges serves out the breakfast allowance to him, and sees everything connected with the sledge secure and safe.

The tent is made of light, close, unbleached duck, weighing 12 square feet to the lb., lined with brown holland across the head, or end opposite the door, up to a height of 3 feet, and along the sides to a height of 2 feet. It is spread by means of tent poles, two (crossed) at each end, and set up with tent ropes or guys. A window, 6 inches square, is fitted at the upper end with a flap to trice up or haul down. There should also be a pocket at this end for the use of the officer, in which instruments, &c., might be placed. A cook's pocket at the opposite or door end of the tent is also convenient. In *very* severe weather the cooking has sometimes to be performed inside the doorway; it is, however, very objectionable, and should not be practised more than is absolutely necessary, as the steam condensing covers everything near it with fine particles of frozen vapour, and the soot from the stearine lamp blackens everything. The furniture for a tent consists first of a waterproof floorcloth, made of a light description of mackintosh; this should be used with care, and only over snow. The coverlet should be made of the Hudson's Bay 3-point blanket or thick duffle, its upper side covered with glazed brown holland. Three stops should be sewn on one end of this coverlet, for tying it when rolled up, and when in use for tying it to the lower robe at the upper end or head of the tent. The knapsack forms the pillow.

The canvas floorcloth, though not absolutely indispensable, is, however, very useful. It is made of very light unbleached duck, and is also used as the sledge sail, which is only set when the wind is abaft the beam. It should be laid down over the waterproof floorcloth, when the men are taking off their boots and taking their suppers. In severe weather, when the breath condenses in the tent and falls in minute frozen particles, the canvas floorcloth is useful to spread "over all" after the men have laid down, as it catches all this fine snow, which would otherwise penetrate into the coverlet, where it would thaw by the heat from the men's bodies, and be frozen into them again when exposed to the air. "So rapidly," says Sir Leopold M'Clintock, "does frost accumulate, that in eighteen days of travelling during the month of October, I have known the coverlet and the lower robe to become more than double their original weight."

The lower robe or blanket should be of the same material as the coverlet, namely 3-point Hudson's Bay blanket or thick duffle. It should have a covering of brown holland on its underneath side, having stops on its upper side to tie to similar stops on the coverlet when

spread for the night: probable weight of the lower robe about 17 lbs. This robe has sometimes been of fur, but it has its disadvantages, as in the first place it is more absorbent; a skin will when wet emit a disagreeable smell; the hairs come out, and they shrink very much; they are also more stiff and unmanageable when frozen. The above mentioned woollen materials are on the whole preferable, as they are quite as warm as fur, when covered with the brown holland, in addition to which evaporation from the body will generally make its way through woollens, and escape into the air, but in the fur robe is arrested and condenses in it. The coverlet, lower robe, and sleeping-bag answer well when the temperature is no lower than -30° , but should it fall lower, an additional coverlet should be supplied, as well as a small blanket bag to put into the sleeping bag to keep the feet warm. Should the temperature continue to fall, snow huts should be used, they being very much better and warmer than tents. A party of four men can, after a little practice, hut themselves in about half an hour; one man cuts the blocks, another builds, and the other two carry the blocks and fill up chinks, &c.

Building a hut with a large party, however, is a different matter, the difficulty in constructing the dome greatly increasing as its diameter is enlarged. It then becomes a question whether it would not be more advisable to build two huts, and to divide the tent robes, &c., between them, or to build four walls enclosing a space of about $6\frac{1}{2}$ feet wide, and long enough to accommodate the whole party (14 inches being the allotted space of each man). The tent is then used as a roof, by being laid over the walls, and snow thrown on it to prevent the wind blowing it off. The walls should incline inwards slightly, and be about 5 feet high, and the floor excavated to a foot or so to give additional height inside. The advantages a snow hut has over a tent-roofed house, is that should the temperature become high, the moisture overhead runs down the walls in the former, whereas in the latter it drips, and makes the tent so wet that when it freezes again it is almost impossible to spread it. The snow hut which Englishmen should construct (that is, without the aid of the Esquimaux) is made of slabs of caked snow about 2 feet long, 1 wide, and 6 inches thick. The site (a circle) is first marked out on the snow, and beginning with a very narrow slab, inclining slightly inwards, the building is commenced and continued spirally, until at a height of about 5 feet, when a single rounded slab is cut, closing up the centre of the dome. The entrance is as low as possible, and is cut the last thing by the man inside. When the temperature is low it will be found preferable to encamp on snow rather than on land, and still warmer upon ice when there is water underneath, which will materially add to the warmth and comfort of the encampment.

Whilst dragging the sledges it is very necessary to keep continually changing the leading men on the dragropes, as on them rests the severe task of exerting their eyes in order to pick their road, and they are therefore more subject to snow blindness than the others. The officer, when not engaged in dragging the sledge, should be very particular in selecting a good and easy line of country; this is of the utmost importance.

We will now suppose that the season for sledge travelling has passed, the sun no longer sinks below

the horizon, the object for which the sledge parties have been striving has been gained, and they have all returned to their ship, which they left three months before frozen up in the solitude of their winter quarters. Some, which have returned early, after taking out depôts for the extended parties, have since been actively engaged on regularly organised shooting excursions. But all are back by July. They return to a busy scene. Active preparations are being made to get the ship ready for sea. The housing is taken down and stowed away below, and it is to be hoped will not again be seen, as rumour whispers they are homeward bound; spars are swayed up and sails bent and the ship is again "all a taunto," and all are anxious once more to feel the long roll of the ocean. The open water is seen to the southward from the crow's-nest, but it is some distance off, and the ship is held fast in the wintry grasp of the ice. The month of June has come and gone, July is nearly at an end, if they are not shortly released they will perhaps be doomed to spend another winter in that inhospitable and inclement region. During the preceding months those on board have not been idle, as a long line of ashes, sand, and rubbish of all descriptions, thinly sprinkled from the ship's bows in a long straight line to the southward, will testify. This has been done with the object of penetrating and rotting the ice, the dark colour attracting the heat of sun, so as to make a passage for the ship to pass through. This device has failed and others must be resorted to to effect their liberation.

Blasting has been determined upon. Charges of 3 lbs., 5 lbs., and 10 lbs. of ordinary gunpowder will be prepared for use, in tin canisters, with Bickford's fuze. If, however, the new explosive "cotton gunpowder" should be the substance selected to carry out this object, a small charge of about 2 lbs. is prepared, primed with its detonator, to which is attached a short length of Bickford's fuze. Operations are commenced from the open water and carried on towards the ship. A hole is made in the ice by means of a drill some distance from its edge, and the charge is lowered down through this until it reaches the water and is placed immediately under the ice. The fuze is ignited, a sharp explosion takes place, and the ice is shattered and rent in all directions. Men in boats, and others armed with boat-hooks and long poles, at once assail the fragments, removing them from the channel into the open water. These operations are repeated until a clear channel has been made, through which the ship is able to steam and thus effect her escape. The advantages which the "cotton gunpowder" has over ordinary black gunpowder are numerous. It is a much more powerful explosive, its proportionate strength to common powder being as eight to one, but its great merit is said to consist in its perfect safety. If put into the fire it will burn quietly without any explosion, nor will it explode on concussion.

The practice of ice-blasting is not a new invention, and had been much resorted to by the various search expeditions. Their plan was simply to lower a glass bottle, or preserved meat tin, containing from 2 to 4 pounds of ordinary gunpowder below the ice and explode it. The results were most satisfactory. Lieutenant Meham tells us that during Captain Austin's expedition, in 1851, a blasting party was

employed for twelve days in detaching a floe from the eastern shore of Griffith Island. With 216 pounds of powder they cleared away a space 20,000 yards in length, and averaging 400 yards in breadth; this ice varied from 3 to 5 feet in thickness. The estimated weight of the ice removed was about 216,168 tons. The heaviest charge used on this occasion was 16 lbs. lowered 10 feet below 5 feet ice; its effect was the breaking up of a space of 400 yards square, besides splitting the ice in several directions. The last charge would be equivalent to 2 lbs. of "cotton gunpowder," but the results with the latter explosive would, in all probability, be far more effective.

The work of an exploring expedition in the Arctic Regions for the period of twelve months has now been detailed. No unforeseen accident, no detention in the ice, in fact no casualty of any description has been taken into consideration, but everything has progressed under the most exceptionally favourable circumstances. That the same will be the case with the Arctic Expedition of 1875 is too much to expect, but that it will be successful in exploring a large area of unknown land may be confidently hoped and anticipated.

CAMERON'S VOYAGE ROUND LAKE TANGANYIKA, AND THE DISCOVERY OF THE LUKUGA OUTLET.

EARLY in March, 1874, Lieutenant Cameron completed his preparations for surveying the southern or unknown-half of Lake Tanganyika. He hired two boats, which he named the 'Betsy' and the 'Pickle,' the latter as a tender. For the 'Betsy' he made a sail, and also rigged a waggon roof awning in the stern. He marked a lead-line for soundings up to 65 fathoms, and, having hired two guides, he started from Ujiji on the 13th of March.

The first difficulty arose on the 18th, owing to the belief of the crews in some sort of devil at the Kabogo Point, to which they offered up a quantity of beads from the bows of the boats. The point is a double one, the second being called the devil's wife. The timid boatmen caused much delay, through their habit of coasting round every little bay and indentation, instead of going direct from point to point. The shore consisted of low wooded hills coming right down to the water, with landslips showing red patches. On the 23rd Ras Kungwe was rounded. The encampment that night was near the village Kinyori, where Cameron witnessed a native dance. The country, on the east coast, is very hilly, the ground rising 800 to 1000 feet above the lake, and the highest point, at Kungwe, being 1500 feet high. On the 28th, Cameron, after pulling and hauling through a canal much choked with reeds, for half an hour, reached a populous village called Karyan. The people have cattle and abundant supplies of provisions, and trade in ivory and slaves. Their spears are very long, with blades 20 inches by 2 inches, and the hafts grooved so as to give a good grip. The clothing, which admits of a fresh suit every day, consists of a bunch of grass in front and another behind, making them look exactly as if they had tails.

On the 30th of March the voyage was resumed, rounding Cape Makangazi, and on the 3rd the boats

rounded the point at the mouth of the river Kifisia. Here the land becomes low, and the hills recede from the shore. The coast is being washed away, and at the river Musamwira there is a long spit with patches of grass, forming a sort of marshy island with shoal water extending far out, which was all land a few years ago. The Musamwira is the drain of the Likwa into the lake, and where the spit and shoal now are there was once a large village. A strong current was here setting W.N.W.

As regards this eastern shore, the southern limit of the Ujiji district is the Ruche River. Thence to Malagarazi is Ukaranga. Then Kowendi extends from the Malagarazi to the Musamwira. Ufipa stretches from the Musamwira to the south end of the lake, and then come Ulungu and Marungu.

On the 7th the boats were off the Mpimbwe Promontory, composed of enormous blocks of granite; on the 8th they passed Ras Kambembe and Ras Kalanki; and on the 9th, sailing past the Makakamo Islands, which are said to have been part of the mainland within the memory of man, they encamped at a place called Kilata. The next places of importance are a village on the Kowenga rocks, and the river and village of Makukiva, with a stockade and ditch. Here the lake is only 10 or 12 miles across; and the land at the south end is visible. In this district much cotton is grown and manufactured. "On the outside of Pulungu Island the rocks were in enormous masses, piled up in vast overhanging blocks, the whole overgrown with trees jutting out from every crevice, whence hang green creepers 50 or 60 feet long, and through these fringes a glimpse may be caught here and there of hollows and caves. The scenery seemed like some grand transformation in a pantomime, and one almost expected to see the rocks open and sprites and fairies come out. All is silence; but suddenly, as one pauses to gaze on the marvellous landscape, the long creepers begin to move, and a troop of monkeys, swinging themselves along, appears upon the scene. They stop and hang by one paw, chatting and gibbering at the strange sight of a boat. A shout—and they are gone."

On April 17th Cameron reached the south end of the lake, where there is a river called Kirumbwe. He was not able to obtain sights, but his dead reckoning, day by day, was calculated with great care, and immediately plotted on a chart on a scale of 5 miles to the inch.

On the 18th the boats came to Kasangalowa, where palm-oil trees were seen for the first time since leaving Ujiji. Here the men all carry bows and arrows, and short spears, a knobstick, and shield of skin. These Watuta were friendly. They live by the chase. At one of the villages, called Kisunge, Cameron was much interested in watching a potter at her work. First she pounded enough clay and water for one pot, with a pestle, till it formed a perfect homogeneous mass; she then put it on a flat stone, and gave it a dab with her fist in the middle to form a hollow, roughly worked it into shape with her hands, keeping them constantly wet, and then smoothed out the finger marks with a corn cob, and finally polished the clay over with a piece of flat wood, and a bit of gourd which gave it the proper curves. Finally, she traced an ornamental pattern, with a fine pointed stick. It

had no bottom, but after it had been drying for five or six hours, in a shady place, a bottom was worked in from another piece of clay. These pots hold about three gallons, and the shapes are very graceful, like the amphora in the Villa Diomede at Pompeii.

On the 21st they came to Akalunga. Here the granaries are built on posts, with circular floors, raised 3 feet from the ground, and 12 feet in diameter. Some of the largest are 20 feet high, exclusive of the conical roof. The sides for granaries containing old corn are plastered over, with a small hole under the eaves for access. Those for young corn are made of canes hooped together, and admitting the air freely, to prevent heating.

Here numerous little streams and torrents were pouring into the lake, and Cameron thought that there were also springs in the bed, for in several places where landslips had occurred, the water was bursting out between the stones, and trickling down into the lake. The country seemed like a great sponge full of water.

The districts on the west side of the lake, commencing from Marungu, are Utembwe, Uguhha, Ugoma, and Uvira. At the north end is Uzigi, between which and Ujiji the district of Urundi intervenes.

On April 24th the boats passed Runangwe on the west coast. Here there were very high rocky hills covered with trees to their summits, and a couple of *soko* (chimpanzee) were seen amongst the rocks. At this point is the Runangwa (the Marungu of Burton), which is in reality 80 miles from the south end of the lake. On the 26th much cultivation was seen, and small villages without stockades, a sign of more peaceful times. There was a fresh breeze, and Cameron took in a reef by twisting the tack of the sail into a rope for a couple of feet and lashing it. The wind was aft, and a pretty good sea was running, so a second reef was managed by putting a lashing round the after yard-arm.

On the 30th, when the boats passed Tembwe, it was a dead calm; and soon afterwards the mountains near the lake rise to a height of 2500 feet. This is the Uguhha country. On May the 3rd Cameron made sail to a slashing breeze, freshening up from the eastward, rounded Ras Kainpumba, and at 11.40 A.M. the boats entered the river Lukuga, the outlet of Lake Tanganyika.

The chief came on board and reported that the Lukuga flowed into the Lualaba, but that the navigation was difficult owing to the quantity of obstructing vegetation. No Arab had ever been down it. On the 4th Cameron went 4 miles down the river, which he found to be 500 to 600 yards wide and 3 to 5 fathoms deep. At the furthest point he was stopped by grass, but found that a way could be cut for small canoes. There is a bar at the entrance of the outlet, caused by the washing away of the shores as the stream flows out. The width at the entrance is 1½ mile, but most of this was a grass-grown sand-bank, leaving only a small entrance at the southern end, where there is a bar on which the surf breaks heavily at times. The least water on the bar is 1½ fathom, while inside 3 to 5 fathoms were obtained. There were 3 fathoms close to the grass which barred the progress of the boat 4 miles up the river. The taste of the Lukuga water is the same as that of Tanganyika, which is



peculiar ; while the water of all the other rivers is quite fresh. The shores outside are low, flat plains, with sand-banks and long grass, formed by all the drift matter of the lake gravitating towards its outlet. While Cameron was in the river a large quantity of drifted wood floated down the stream, and worked its way into the obstructing grass, without leaving any sign of its passage. It struck him that where these logs, 20 to 30 feet long, could go, ordinary canoes might progress without any extraordinary amount of labour. The current was flowing out of the lake at a rate of 1.10 to 1.15 knots an hour. The chief reported that, half way to the Lualaba, the Lukuga outlet received another river called the Lurrumbuji.

Leaving the Lukuga, the voyage was continued, and on the 6th the Kasenge Archipelago was reached, and with a fresh breeze Cameron completed his adventurous voyage, arriving at Ujiji again on the 9th of May.

On his way across the lake, when starting for his great westward journey, he intended to leave some of his men at Kasenge, and to go with the rest to make a more complete examination of the outlet, before finally starting for Nyangwe and the Lualaba. He expected to reach Nyangwe by the beginning of August, and the Yellala Falls of the Congo by November.

INDIAN FAMINES.

ENGLAND has now before her the reports by Sir Richard Temple on the "services of famine relief officers," of "landholders, and native residents," and on "European non-official residents." He is happy to say that "the list of officers who have done good work is a long one," and "if need should again arise for similar services, the present record will show the names of officers fitted by experience for every kind of relief duty." Including civilians, military officers, rajahs, native residents, marine officers, railway officials, indigo planters, and European non-official residents, I find about 294 names in the *Homeward Mail* of the 21st of December 1874. Every one of these men deserve not only the thanks of their immediate superiors, but, when the time comes, England will declare her satisfaction at the wonderful display of energy in her sons, and in her subjects. She is accustomed to long lists of military and naval officers—men who have deserved her thanks for the destruction of her enemies; but she has never had before her so long a list of men who deserve their rewards for saving the lives of her Indian populations, for fighting against the unseen demon of destruction hurling his unseen famine upon earth.

It will be long before England can comprehend the greatness of this contest or the difficulty of victory. She does not know the faculty possessed by her Indian fellow creatures of lying down to die. She hears of it now and then in her great cities in the winter time, when a timid, worn-out mortal submits to cold, starvation, and death, sooner than ask his neighbour for assistance. In India the end is accepted by thousands as their inevitable fate, taught them by traditional belief. Against this fatalism the authorities have had to contend; they have destroyed the traditions, they have employed and fed the people, not with food grown upon the spot, but brought at a great expense, under great difficulties, from long distances, by every

possible conveyance. Health, discipline, security, division of labour, all had to be thought of by a handful of men presiding over some 25 millions of human beings, of whom, says Sir Richard Temple, 4½ millions were in a starving condition. From the Viceroy down to the lowest and the least employed there must have been an amount of energy exhibited which can only be comprehended by those who have witnessed these famine scenes, and which never can be measured out with equal scales among the scanty heroes of the fight.

A few words taken from the minute of Sir R. Temple will show us the spirit in which the famine duties were undertaken:—"Mr. Stuart Bayley (Commissioner of Patna Division) held the most arduous and responsible office of all the executive officers:" he held larger, and more distressed districts, with about "2½ millions of people." All the relief operations of Patna, as well as the North Behar transport department, were under his general command; his current duties were conducted well, and he kept all classes at work without friction; "he was present whenever conjunctures threatened to arise, and he won respect and co-operation from officials and non-officials." In a man-of-war, in a regiment, officers experienced in the work have discipline at their command; to Mr. Bayley all was new, his inferiors had to be trained to their respective duties over a crowd, and a confusion, in a very Babel of language. I have experienced the scene. England knows nothing like it, or of the value of the supervision exercised by this gentleman. From his conduct we may form an idea of the conduct of all that come under the headings given by Sir Richard Temple—supervision—medical—transport by land, by river, and by sea—public works—relief—railways—irrigation—electric telegraphs—the Secretariate, and the duties undertaken by Zemindars and private persons. "When," says Sir Richard, "so many officers have done well, it is impossible to render due thanks to each individually; but to the body of the officers collectively, who have served on this occasion, the Government of Bengal desires to tender its acknowledgments with the strongest expressions it can use." When the time comes England will know how to thank them and all concerned in assuaging the terrors of this Indian famine.

There was something wanting when this famine was first brought to the notice of England, and there is something wanting at the end of it. We have not got a record of the numbers employed, of the works undertaken, or of money spent. Sir Richard hopes that the accounts will be ready "within three months of the close of operations," and that the officer in charge of the duty "will eventually present the charitable public with a statement showing how their funds have been spent."

We can glean a little of the magnitude of operations from figures scattered about this report, but it is possible that they only represent a small portion of the whole. There were 130 relief centres, there were about 4½ millions of famishing people; 250,000 tons of food had to be moved to and across the Ganges; there were 25,000 carts in one transport duty; 12,000 carts, and 12,000 pack bullocks in another. The reserve transport had 3685 carts, and 11,500 pack bullocks—representing about 23,500 pack bullocks, 81,370 cart bullocks, and an army of some 43,000 men to look after them—camels, elephants, boats, and ships are not counted. There were 4000 miles of

road on which 1,730,000 people were at one time working, and on which "1,750,000*l.* have been spent in six months." In the *Times* of the 4th of August 1874, Lord G. Hamilton puts down 6,414,250*l.* as the probable total expenditure. The work done, the people employed, and the people fed, make that sum look too small. It might have been better to await the preparation of the whole history before placing before us a portion of this great work, for which a loan of 10,000,000*l.* was asked and sanctioned. A minute of thanks is not, however, a record of all that was done; but we find things in this record which scarcely coincide with things that have gone before. Sir R. Temple in writing of some collectors says, "they promptly informed the Government of the failure of crops whenever it occurred." This we may remark is the ordinary duty of every civilian in charge of districts.—"They exercised foresight regarding the approach of famine," and they "exhibited self-reliance and self-help in mastering the affairs entrusted to them." Of the latter we have no doubt: of the foresight we have. On the 24th of April last, the Duke of Argyll told the House of Lords that this famine came upon them earlier than usual: "there was no alarm in the early part of September," and it was not till the 25th of October 1873, that Sir George Campbell "telegraphed to the Viceroy that, besides the failure of the July and August rains, there was additional failure, and therefore there was cause for grave alarm." If, then, the collectors exercised foresight, their superiors did not, or the advent of a famine might have been foreseen in August. Time is very valuable on these occasions: with a little more of it Lord Northbrook might have adopted a policy better adapted to the situation, than that which was forced upon him by the absence of foresight somewhere.

A few words will place the subject clearly before us. Lord Salisbury told the House of Lords that the sudden rise in prices, and the sudden destitution of the people, took many local officers by surprise, and made the transport arrangements faulty. In the *Mail* of the 4th of May 1874 we find, "The famine comes in these parts with a sudden rush," "people flocked by tens of thousands to the relief works." "There were scarcely any tools for them." They were for a time a disorderly mob. "There was immense waste and immense confusion." If the *Times* correspondent wrote truly, and we have no reason to doubt it, he gave us a picture of the scene five months after the Viceroy had issued his instructions, and eight months after the local officers foresaw and reported a failure of crops, and a coming scarcity of food. Reports and foresight might have existed partially, but not as a whole—it would have been well if Sir Richard had cleared up these contradictions.

Now for the other policy that might have been adopted if more time had been given to the Viceroy.

Most part of the area, over which desolation hung by a thread, is one of the most populous regions of the earth; it could not have reached that condition without fertility in its soil, without protection to life and property by the rulers, or without an equitable ministration of food by its agents. We will call these food agents "Banyans." They compose a vast body of men; they are in every village; they have sat at the receipt of custom for thousands of years on the same spots, often in lineal descent. In former times they

had much consideration paid to them; they were included in the general taxation of the people; from time to time they arranged the price of food, while transit duties were levied from them on imported or exported grain. These taxes were, I believe, abolished all over British India in or about 1836. From that time up to the imposition of the income tax the Banyans were, I believe, relieved from all taxes excepting the voluntary municipal dues. Up to 1873 the condition of the populations is evidence of the good management of the Banyan as a cosmopolite item. We were told by the Duke of Argyll that three good seasons preceded the year of scarcity. It is, or it was, usual for Banyans and for some cultivators to keep a year's estimated stock in hand. It is quite possible that this practice, or the legend of it, prevented the alarm, natural on a failure of rain, from expanding till the end of October.

If the officers on the spot knew of the failure of the early rains, it is certain that the Banyans knew of it also. We may assume that they look out for their own interests. We know that the labouring populations of India are always on the wrong side of the books with the money-lender and the Banyan; and we may suppose that neither of these will give more credit when a scarcity is likely to break the bank of the population. It was suggested as a measure of relief for the afflicted area, that the exportation of food from it should be prohibited; but Lord Northbrook could not prohibit in October what had been done, or what was then doing. It is in evidence that thousands of tons of food were exported from the distressed area, or from its vicinity between September and November. The Banyans had the means of transport, and they knew of a good market.

The policy alluded to would have kept all this food on the spot, because a market would have been ensured to the Banyan at his own price, without the expense of transport. It has been shown by experience that under this policy the Banyans will import food; so that, if the Banyans can be persuaded to do this all over a famine area, it is evident that the policy is beneficial to them; while the importation of food and the feeding of their constituents by another is a direct interference with their ordinary trade, though it may tend to maintain the solvency of the general bank. The policy alluded to may be found in the records of the Sholapoor office, or in the Secretariate of Bombay. It was practised on my own responsibility during the great famine of 1833-34. My proceedings were approved of, and the outlay sanctioned by that wise and excellent Governor of Bombay, Lord Clare: the outline of it is simple.

Every officer in charge of districts receives weekly rain reports from his native subordinates. The failure of rain means a failure of food; this failure is known, or ought to be known, in the month of August. The Banyans are then to be consulted as to their stock in hand; the intentions of Government to give occupation to unemployed labour is to be declared to them; estimates are to be made of the possible demand. The Banyans are asked if they can meet it at their own price, Government undertaking to pay their bills. In the Sholapoor district the Banyans undertook the duty, importing during the season sufficient food for all demands, and securing to themselves the profits of their arrangement. The works on which the starving

labour was employed were simple. As the ordinary official duty of the districts was in abeyance, there was plenty of superintendence, while each gang of thirteen furnished their own overseer; clerks of the works visited the gangs twice a day, furnishing them with tickets; these tickets were exchanged for food at the nearest shop, and became the voucher for the Banyans' bill in the evening; police patrols were constantly supervising the labour, and the multitudes of those incapable of work.

Under these arrangements the Sholapoor district met this extensive famine with success. All that was done was arranged by the officer in temporary charge, in the discharge of his ordinary duties, on his own responsibility. The suggested measures were duly reported to and confirmed by Government. We do not find that any officer in charge of a district in Bengal, in 1873, assumed any responsibility; but, instead of being prepared by the experience of frequent famines, all seem to have asked their superiors what was to be done. Sir George Campbell asked the Viceroy, he reported to the Indian Council at home; and we find in the *Mail* of the 27th of April 1874, "that as Lord Northbrook and Sir George Campbell were not agreed, there was an argument for the Secretary of State stepping in on his own responsibility, and deciding the great question of the policy to be adopted." Luckily, the Duke of Argyll knew that he "could not do so with advantage." Lord Northbrook was left to carry out his own magnificent and liberal policy; he conquered his gaunt, his invisible foe, and retained his own authority.

However much the loss of responsibility in officers in charge of districts may be regretted, there is, perhaps, a more hideous shadow in the distance, rising out of the policy adopted by the Viceroy. It will be as well to look at it in its present shape before it grows into a reality.

The newspapers tell us that on a late visit to Sorepore, "a representative body of the leading native residents," in an address to the Viceroy, said—"We natives of India do ever naturally look up to our rulers for help in time of need, and the generous policy of your Excellency, which has recognised the duty of furnishing food to the famishing masses, as one of the functions of Government, will for ever endear your Excellency to the Indian heart." In reply, the Viceroy is reported to have said that Her Majesty the Queen had "been graciously pleased to notify her cordial approval of the policy of Government for the relief of their necessities"—and then he allowed that "in all countries it is the duty of the proprietors of land to aid in times of difficulty those from whose industry their wealth is derived in times of prosperity." Will these words nourish an *Upas tree*? Will the late policy prove to be the precedent for all future famines? There are signs of frequent repetition.

The Banyans are very numerous, they can combine for their own interests, they can raise the price of food beyond the means of the ordinary labouring classes. Lord Northbrook frequently evinced his desire not to interfere with private trade; every grain of rice he gave out was an interference with trade, and cosmopolitan duty; but this private trade went on in the famine districts from the beginning to the end of the famine. All of those who could find

occupation left the Government Relief Works long before the harvest of 1874 supplied their food; there was, therefore, food in their respective villages. We do not know if any measures were adopted to ascertain the quantity of food in store; all we know is that its price was beyond the means of those millions who sought relief from Government, and that Government accepted this as a proof of famine.

It seems to be forgotten that a famine cess was ever laid on the non-cultivating portions of the Indian population; this cess prevented a rise in the price of food beyond its legitimate limits; it kept the Banyans in some discipline. While they were taxed for ordinary imperial purposes the authorities knew something of them; when they are not taxed they are unobserved, and they forget that they are integral parts of a great whole. The Banyan population is increasing. In the Deccan they extracted from their cultivating constituents from 75 to 250 per cent. per annum (see the records of Sholapoor, 1873-74). If they do so in Bengal, the shadow of famine is on the increase, for they can and they will raise the price of food, not in proportion to its scarcity, but in proportion to their own wants.

As these wants multiply, there is a decrease in the production of food. We have seen by a late report that the supply of Indian opium is increasing; jute, linseed, cotton, tobacco, and other things are occupying the food-producing lands, so that, while mouths multiply, the food decreases in quantity, and increases in price. The words of the Viceroy are as applicable to these Banyans as they are to the proprietors of the soil, but instead of aiding those from whom they derive their profits, they increase their misery, and drive them to despair. There were three good seasons previous to this famine. When was the food of 1872 exported from these regions, or was it all consumed? We have no statistics, we do not know of any inquiry; but, as we have shown, there was food. A native community has thanked the Viceroy for recognizing as a duty the feeding of a nation. The words will be adopted by all; the duty will not be lost sight of, unless England steps in to insist on fuller information than has been given. To enquire why, with so much experience before them, the Indian Government in England and in India has not prepared a famine code to be ready in the hands of every district officer, to act upon in cases of local or general distress? We have drawn the outline of a famine treatment; the machinery on the spot is better than any that can be improvised, and it is better to keep communities in harmony than to sever them by introducing foreign ingredients. We have no doubt but that all these points are well known to our Indian authorities. Responsibility has gradually died out; England, or a party in England, stamps upon the head any one who, in assuming it, goes beyond their narrow limit. There is no code for action when inaction is death. We have forgotten that, in emergent cases, it is better to act wrongly, than to ensure a catastrophe by inaction. The old wheels that used to run so smoothly are out of gear by friction and disuse.

Twenty-five years of ordinary and extraordinary revenue duties in the Deccan gave us a tolerable insight into current practice, and into old taxation. Systems and details vary in every Indian province, but the nature of man is not dissimilar; there were the

Tammany Ring in New York—frauds on the Stock Exchange of London—a Government Bank of Bombay failed, and the Banyans of Bengal have won. Every labourer is a source of income to some Banyan, and these labourers have been preserved to him when he would grant no more credit to them. All glory to Lord Northbrook and his Executive for the saving of human life; but there are things we want to know, and a future to look to. We ask the Indian Government to prepare for that future, and to tell us what steps are taken to ascertain the amount of stock of food in hand, or whether they accept a high price of food, put on by those most interested, as a proof of famine?

H. P. MALET.

A VISIT TO THE LANDES.

A FIRST hurried visit to this rarely traversed region left impressions so curious upon my mind that I resolved upon a second and more leisurely ramble whenever the opportunity should recur. It was offered me, not long since, at Bordeaux, and I gladly left the beaten paths to go again amongst the stilt-walkers, whose country is called, emphatically, The Desert. It is little known, even to Frenchmen. There is not much to fascinate in that vast, sterile tract, supposed to have been a former bed of the sea, which spreads over so large a portion of the Gironde and the Lot-et-Garonne—wave-like in its surface, shifting sands upon fixed sands, patches of cultivation, and the rear-guards of retreating forests here and there; now and then a bog; occasionally a perfectly horizontal plain intersected by a black-looking stream in a gully; and a few far-scattered villages, or groups of unwalled sheds such as might be met with by the traveller in Central Africa. In all this there is no attraction of the common kind; yet in the very monotony and dreariness, the almost Libyan solitude, the forlorn emptiness, so to speak, prevailing for immense distances, a sort of charm exists, which changes into absolute wonder when an inhabitant comes upon the scene—a grotesque creature clad in sheepskins, mounted on a pair of wooden supporters, reaching to his knees, and strapped to them and his ankles, with a scanty flock of sheep nibbling at almost invisible herbage, and, when addressed, so unintelligible to you, who have come from Paris, that he might as well be as silent as a Syrian bishop. From the Garonne to the Adour, from the Gelise—which smells like a tanpit—to the Bay of Biscay, these territories of South-Western France, the ancient Aquitaine, and more modern Gascony, extend, parts being half-cultivated, others hopeless gravel, some reclaimable sand, but all hostile to grain-crops of any description. The effect upon the imagination of all this barrenness, dreary in spite of the sun, is difficult to describe. The small cattle-herds are composed of beasts so diminutive and thin that they appear to have been starved out of their natural size. Whence they get their fodder and water is a puzzle. Again and again have the peasantry of the Landes attempted, in their ignorance, to fertilize the soil, if soil it may be called, by setting fire to what miserable vegetation flourished, or rather did not flourish, with the result of creating a worse aridity than before. The true offspring of the Landes are sea-pines, as they are termed by the

French, dwarf oaks, and acacias. Enterprising societies, with handsome capitals at their command, have been formed to promote an improved agriculture in these Arabian wastes, and their money has been no less irretrievably lost than if buried with a wreck in the bosom of the Goodwin Sands. The *pin maritime*, however, redeems the department from utter poverty. This is a peculiar tree, not mentioned by Linnæus. Once planted—by what mysterious process Science is still unaware—it is certain to thrive, to shoot up, arrow-straight, to multiply its splendid cones, and, in its twentieth year, to yield the “resin harvest” which is the wealth of the wood-dwellers in the Landes. As tired of the sands that seemed interminable, I struck into the shade of these forests, that reach to the Pyrennees and beyond them, I came upon many a solitary man, woman, or child engaged in collecting the valuable exudation which is the material of turpentine and lamp-black. A notch is made in the trunk, near the root; a crescent-shaped pannikin of metal or earthenware, marked with the cypher, as it were, of its owner, is locked below; the valuable gum trickles into this, and, when full, is replaced by another: and the supply may continue for a century, without exhausting the tree. Some of the *resiniers*—the appellation of the people following this industry—dig a hole in the ground, near the roots, about a foot deep, the sides and bottom beaten hard and smooth: early in February, armed with notched knives, they rasp through the three layers of bark, taking care not to wound the skin, and laying this latter bare at intervals of a yard. After a month has elapsed, incisions are made in the heart of the tree itself, each cut being connected with the others, so that the flow descends at length through a single channel, which is 2 inches deep, and this stage of the work is accomplished by means of the notched knife, a wooden ladder, and a miniature hatchet. The gains from this labour after all are poor, albeit that throughout the Mesopotamia of the Gironde and the Adour, resin-water drinking is an infectious habit, like mineral-water drinking in Germany. It is smelt at every *table-d'hôte*; it is gulped in the course of morning walks; it spoils the native wine; it is, in a word, fashionable, in the Bordeaux sense of that term, for Arcachon is the Tunbridge of the Gironde, its very name signifying an unguent. Nor do I wonder at the pale, attenuated, saddened look of the “hut-men”—my few walks down those long vistas of pine were each succeeded by an excruciating head-ache, caused by the overpowering odour.

Other industries, however, are carried on in this desolate region, though the pine is to its people what the palm is to the Arab. It supplies the vine-grower with his poles, the tent-dwellers—of whom there are many in the Landes—with their pegs, the engineer with piles for foundations, the telegraph with posts, the road-maker with wooden kerbs, and the inhabitants, at once, of the forest and of the plain, with fuel. Thus the wood-cutter's occupation becomes an important one, as all the old trees are felled, axed into commercial shape, and drifted down the rivers, where these are accessible. Otherwise they furnish a supply of charcoal without an appreciable limit. So do the White Virginian Poplar, the Dutch Poplar, the willow, birch, and alder. But I saw few of them; it all seemed like an eternal march of pines, gloomy as a

picture by Gustave Doré. Seeking for the owners of these solitudes, who might give intelligent information concerning their capacities and prospects, I found them to be uniformly absentees. There are three classes:—absolute proprietors; colonising proprietors; and a wholly illiterate peasantry, animated by but one idea—that of “the good old times”—concerning which they can tell you nothing more than that they are past. The peasant of the Landes is a patriarch of the ancient type; the head of his family, and how does that family live amid these unproductive sands? I had several meals beneath its roof, presently to be noticed, and more heartiness or a warmer—I may say a prouder—hospitality never was accorded by Bedouin Chief to way-worn traveller. The salt was eaten so soon as you crossed the threshold. We ate fowl of a somewhat “ancient and fishlike” character, followed by lean pork; with these, cakes of rye-bread, exceedingly dry and black as a Spartan’s broth. It resembled rather the Arab *Couscous* than the Italian *Polenta*, and contained an inordinate proportion of salt. Yet, with my rough hosts, in blouse and gaiters; quaint caps, never taken off, I verily believe, even in bed, outer sleeveless coats of sheepskin, with the wool turned inwards; and, in extreme weather, a garment like unto a burnous enveloping all—one of which I borrowed, and was thankful for, but could not buy—I enjoyed the primitive simplicity of that archaic shelter. There were several women and children in the abode which was neither a hut, nor a tent, nor cottage; but a thatch, extending from the trunk of a living tree, supported at the four corners by poles of pine-wood, open to all the winds that blow, and fenced about, for a foot in height, by loose stones, or blocks of half-burned clay. The women, when indoors, if the phrase may be allowed where doors are unknown, wore bright and pretty caps; beyond those limits, straw or black felt hats, by no means unpicturesque. Every shepherd of the Landes has several stations, which he designates as his homes; for the pasture will nowhere suffice for more than a few days as the food of even an ordinary flock. Each morning, he rises, just as the dawn is confusing the far distance with coasts and seas of gold, and puts on those unique “leggings” which, elsewhere upon the earth, are called “stilts”; but on the Landes are known as *Chanques*, 6 feet and 6 inches high, raising his feet about two-thirds of that altitude from the ground, and enabling the wearer at once to follow his flocks, to defy wolves, and to pass from one oasis to another with incredible rapidity. No horse in that region can beat him, and he can keep up with the railway trains between Arcachon—a name meaning health-specific—and Bordeaux. At a first glimpse of these fellows on a misty morning balancing their long poles and taking yards at a stride, I thought of so many spectres of the Brocken, so gigantic and supernatural did they appear. The stilt of the Landes is a slightly elaborate mechanism. You have the “upright” to begin with; then a jutting piece of wood, two-thirds of the way up, with a strap, and another leathern band for the knee; while the *échasses* themselves are shod with leather, to prevent both sinking too deep in the sand and slipping on the clay. It is necessary to practice, from the earliest childhood, this method of locomotion. In utter forgetfulness of dignity, I tried it. No clown ever came to grief more instantaneously, or more ignominiously.

There was no question of walking; mere standing was impossible, I fell, flat as a dead Trojan in the Homeric drama. Propped up for a moment and released, the soft sand once more was all my own; but the bitterness of the failure was appeased by learning that the very go-cart of the Landes for babies, is a pair of stilts; the teaching of their use is, practically, a drill; the pupil must never stoop; however irregular the ground, he must preserve his perpendicular; and, great becomes his glory if he, with a nut-brown maid, similarly exalted, dance, at the age of fifteen, in presence of any admiring village, to the rhythm of that which, literally speaking, is a bagpipe. For, notwithstanding the habitual silence to which they are condemned, and the melancholy expression of their countenances, the shepherds of the Landes are gay, albeit—

“Quand nous fûmes dedans les landes
 Bien etonnés
 Nous avions le sable jusq’au mi-jambes
 Des tous cotés.”

Not so the herdsmen. They belong to a heavy and sullen race, and while the creaking of their ponderous ox-drawn tumbrils may be heard from a distance, they are never known to sing; they see their wives and children only at wide intervals; they sleep without a roof; they make companions of the beasts they drive, who will receive their food from them, and from none else, and yet they belong by no means to the brutal or inhospitable orders of humanity. I chanced upon a wedding festival in one of their little, ragged, wizard-looking hamlets. Perhaps a bestowal of brandy from the recesses of my knapsack had softened the Landais heart. Spoken communication there could be none; but by waves of the hand, smiling grimaces, and nods of the head, I was made welcome. A bowlful of dry nuts was thrown contemptuously to where the pigs were grunting, which signified that the lover was an accepted bridegroom; for *donner les noix* is a dismissal. Then, on the part of the lady, a bedstead and a chest were exhibited, the former resembling a model of the middle-age rack, and the latter being filled with the gifts of neighbours. All the girls in the vicinity band themselves together to “keep off the dogs”—otherwise impertinent young men who would make a jest of the ceremony. This I did not see, for “the departure of the bed,” with the rest of the trousseau, piled pyramidically in a cart, had taken place on the evening previous; nor did I hear the bridal-eve songs, though I afterwards obtained specimens of a few in Paris. In them occur such verses as “Her mother has dressed her,” “Strew her path with branches,” “Do not tremble, beauty,” “The world began with a *yes*; it would end with a *no*,” and “The oak shadows will be your canopy and home.” And now begins the genuine Landais festival, which is made up of alternate gormandising, drinking, and dancing. It must be remarked, however, that this is a sketch taken from the abodes of the wealthier peasantry, and that it is also taken from a less dismal district than some across which I saw the stilt-men, and women and children, too, stalking like monsters of the mist, there being a great deal of fog here, at times, arising from the under-layer of clay. The general aspect is too hideous and depressing to permit of anything approaching to social vivacity. Yet, even in the apparently most wretched of cabins, of the kind I have already de-

scribed, I found bread, dripping, wine, red cream cheese, and Gallician sardines, with little granges, of the rudest construction, standing near, full of barley, clover-grass, and pine-cones, though all shrivelled, and suggestive of the question *cui bono?* A word remains to be said about the inns, or *auberges*, for even amid the wildness of that sepulchral land, places of common resort may be, at remote intervals, discovered, where the people sit under rude verandahs, singing in a dialect a good deal worse than Greek for me, but obviously shaped into songs of no very delicate character, and where a sort of white brandy, powerfully flavoured with turpentine, and a species of beer brewed from rye, were consumed, the intervals between the minstrelsy being filled up, as I was afterwards informed, by invectives against the lords of the soil, for, in the Landes, the peasantry denounce the proprietors as tyrants, a piece of flattery repaid by the proprietors by calling the peasantry a race of worthless wild animals. Even in their revels the stilt-walkers and collectors of resin do not appear cheerful; they resemble their country, with its alternation of drab-coloured sand and endless desolations of pine, dark and changeless, except where the bark has been ripped off, leaving the trees bare and reddened, as though some mysterious blight had passed that way. Nearer to the sea, more lively pictures may be seen, among the cottages of the vine-dressers; but a sense of poverty broods unmistakably over all, and the efforts made to reclaim the Dunes have proved, as I think I have already said, generally unsuccessful. There is an inland lake, moreover, known to the dwellers about it, as "The Sea of the Landes," but it is rarely navigated, and, from what I could learn, contains no fish worth netting, though, to a stranger's eye, its aspect is inexpressibly refreshing as it lies, waveless and blue, or rippling, red and violet, to its depths in the light of the descending sun. It was upon the margin of this water that, in an open-sided shed, a man lay dying. Of course, no curiosity would have justified an intrusion upon the scene; but it was evident, from the gravity depicted upon every countenance, that the event was regarded as a solemn one. Nowhere in the world are the graves of the dead held in deeper or more pious respect than by these semi-civilized toilers of the woods, and of an Arabia by no means *Felix*. In their little fantastic structures, which they dignify by the title of churches—being oblong barns, with a porch in front, and a belfry pendant on the side, prayers are continually said for those who have passed away; every spring a formal funeral service is celebrated by the members of the family, on an anniversary styled "the head of the year." I have, however, exhausted my notes and reminiscences, for the journey was a brief one, although infinitely pleasant. It is time to retake the train at Arcachon, and leave the simple solitudes of the Landes for the contrasting splendour of Bordeaux, the queen of the French south, with its brilliant theatre, its bridge of seventeen arches, level as any bridge ever was, and, while returning Paris-wards, I remember gratefully the little knowledge I had acquired of a people so innocent and unsophistical.

HORACE ST. JOHN.

IMPRESSIONS OF JAMAICA.

CHAPTER VII.—PEDRO KAYS AND THE BOG WALK.

THAT a journey from south to north of an island which measures no more than 40 miles in that straight direction; which boasts very fair roads; and which, though almost entirely destitute of inns and posting-houses, is renowned for its hospitality, should demand much preparation and, in particular, a long and difficult haggling in the matter of horseflesh, may seem to belong to the less credible order of travellers' tales. It is nevertheless a fact that before anybody not a resident in Jamaica can start with comfort on this little tour, the main part of which is but the run from coast to coast through the middle of the country, he must become the owner of at least a pair of horses which, except for this same land-cruise, he assuredly does not want. Buying a horse or two, and selling what you have bought when it has served your brief purpose, is only a form of hiring which obtains in Jamaica. I must do the Creole horse-dealers the justice to say that the mistrust with which a European is apt to enter on any transaction of the kind here glanced at has rarely a good cause. Never have I found fairer trading than in this respect; and I would decidedly recommend "the purchasing system" to any friend about to visit Jamaica, and to move rapidly about the island. As for the horses, the work they do, considering the smallness of their frames and the nature of their food, is amazing. As I have before observed, the prolific guinea-grass is much used in place of dry provender, and animals not only fatten but grow strong on this marvellous herbage. Nor does the continual heat of the climate affect the Creole horses, as a few days of sudden and overpowering sultriness in England will affect the jaded hack. Everybody in Jamaica, black, white, or brown, is born to the saddle; and merciful treatment of horseflesh is far more generally the rule in that island than it is, I am ashamed to say, with us who maintain societies for the prevention of cruelty to animals at home. There is no such society in Jamaica; but the cattle are none the worse for the want of it. Then again, the horse, or I mistake, is a tropical animal, requiring more care as he advances farther into cold latitudes. Pending my negotiations with Mr. Furtado, a brown man of excellent repute in St. Jago de la Vega, or let us rather say Spanish Town, I had a day or two on my hands; for, if I hesitated to buy, neither did this worthy dealer in horseflesh appear to be in the least hurry to sell. So, as I happened then to be at Old Harbour, and to have found some amusing black boatmen or fishermen, with an old pilot among them, who had recently caught a fine large shark and was preparing the skeleton thereof, I resolved on improving my new acquaintance. I was to have bought the bones of the shark, principally, as I remember, because of having been greatly interested by the peculiar setting of the teeth. We often hear of a shark snapping off the leg of a man, as easily as if the limb were but a stalk or a twig. Until I examined that long sweeping pair of jaw-bones, with the rows of small, serrated, shell-like, teeth, more in number than those of a reaping-machine, I could hardly comprehend the possibility of a clean amputation by such means; but I understood it then. These amphibious negroes offered to take me

on a little cruise; and as I had some curiosity to look at the strange islets called Pedro Kays, in the vicinity, I willingly consented to accompany them. It was the middle of a broiling hot day, and we whistled for a wind without getting much of one; but on the whole I did not regret my time spent with the negro boys, although my friend the pilot was not of the party in the pinnace. The Kays, four in number, take their name from Pedro Bank, which, with its dangerous shoals, coral reefs, and patches of sand and broken shells, extends 90 or 100 miles westward from the Portland Rock. The colour of the water pointed out to us all dangers, where any beset us; and the same would be the case in all weathers by daylight. The North-East Kay was the first we visited. It is about half a mile long, from north to south, and a little more than a quarter of a mile broad, the highest part being perhaps 15 feet above water. Very little soil is to be found on this rocky islet, which, nevertheless, is partly covered with vegetation. Breakers extend for at least a quarter of a mile to the southward; and some ugly little rocks peep up from the clear water on the western side; but there is a good anchorage just off the south-west of the Kay, in 2½ fathoms of clean sand. The landing is on the north-west shore; and a lovelier bathing-place could not possibly be imagined. Three miles to the south-west, we came upon the Middle Kay, a diamond-shaped islet with scarcely a spadeful of soil, but still more plentifully overspread with brushwood. Here, too, the landing was on the northern side, a reef stretching out fully a mile to the south. The largest of the Pedro Kays is 2 or 3 miles farther to the south-west of the Middle Kay, and is three-quarters of a mile long, with a breadth of a quarter of a mile or more. It has soil enough to grow a palm, and is distinguished by its having two wells of fresh water. The South Kay, which is nearly 5 miles beyond the largest islet, is surrounded by a reef, and can only be approached at a distance of 2 miles. I need hardly say we did not visit this, the last of the four Kays. During our cruise, the vast shoals of fish, and the almost equally numerous flocks of birds, were sources of astonishment to me never to be forgotten. Airing their bodies on the rocks inshore, by spreading out their strong pinions, and thus exposing the whole of their rusty brown-black under-plumage to the sun and such little wind as could be caught by this poor shift, were many of the vultures called by Jamaicans John Crows. As I have often, with too little thought, uttered the language of repugnance and disgust in speaking of these truly sacred birds, I will here avow that sense of error which no man should be ashamed to feel or to declare. Horrible and revolting as may seem to us the appointed work of the vulture, it is, if any instinctive habit in an unreasoning creature can be, a grand realization of the idea of duty, supremely ordained and submissively obeyed. The boundless craving of the vulture fits him for the performance of the most stupendous tasks. A flock of these birds, settling on a carcass far greater in bulk than their whole convocation, will stay there till they have cleansed every bone, so that it shall not taint the air in which it lies bleaching. This I have known done in a very few hours. What wonder, then, that the John Crow of the Antilles should be revered and protected? It is punishable by fine to kill one of

these silent, solemn "officers of health;" and I hope our well-intending friends in the East who are for poisoning as well as for shooting and trapping tigers, will be careful lest, for every envenomed carcass of a man-eater, laid low by strychnine, they pay with a flock of vultures.

My negro companions and I fell to talking much about alligators. If we look at a map showing the south line of Jamaica we shall see evidence that such a topic is no unforced one in ordinary Creole conversation. Alligator Pond, Alligator Swamp, Alligator Hole, Alligator Kay—these are the suggestive names that dot the coast on that southern side of the island. I did not care to correct the prevalent fallacy by which alligators in Jamaica have been so designated. Probably, my black friends would have grinned immensely if I had informed them that they had never seen an alligator, but that the interesting saurian they were accustomed to mention as such was a crocodile. Of this truth I had fully satisfied myself a week or two before my cruise to Pedro Kays. The cayman or alligator of the American continent might be supposed to have relatives on the islands of the Caribbean seas; but, in fact, the formidable reptile of the Jamaican rivers and lagoons is much more closely allied, if, indeed, he be not identical with the crocodile of old Nile. Some naturalists will tell us that the difference is slight. One authority has personally essayed to convince me that the only distinction is a trifling matter of dental detail. He was quite wrong. The crocodile of Jamaica, as of Cuba, Haiti, and Martinique, as well as of the African Continent, is slender muzzled, which the alligator is not; has feet dented on the outer edge, which the alligator has not; swims with great facility, even against a rapid current, which the swamp-infesting alligator does not; is bolder far than the alligator, which has, indeed, been fairly described as a timid animal. But the difference in the head would alone be sufficient to distinguish the two creatures. Not only has the crocodile a longer and more acute snout, but his eyes are unprotected by those protuberances which are so characteristic a point in the alligator or cayman. Yet, I suppose nine in ten, even of generally well-informed Creoles persist in calling their crocodiles alligators. The mistake is important, in so far as that the fact of the true Egyptian crocodile being found at a very great distance from Africa, and close to another continent on which a different species abounds, is surely a noteworthy subject for scientific inquiry.

And now, having completed my bargain for horses with canny but conscientious Mr. Furtado, at Spanish Town, I have before me the account of a journey, to the beauties of which no language can do a tithe of descriptive justice. Mindful of the great necessity of making an early start, in that region of sunstroke and fever, I was so beforehand with the day in leaving my formal adieux at King's House, that not one of Sir Henry's sable household was up and stirring. Only a lightly-clad negress of ancient days was cleaning the floor, with fresh and fragrant oranges, when I found for myself the visitors' book on the vestibule table. Behind my pair of clever, active, willing, little horses, and rattling fast out of Spanish Town, I soon felt the most perfect contentment of mind, on every subject that occurred to me. If this was not a genuine pleasure trip, what was, I should have liked to know?

There are two luxuries for the thirsty traveller in Jamaica—luxuries with which he cannot begin too soon; partly because they are more wholesome early in the morning than at any other time, and partly because, plentiful as they are, one is not always sure of being able to get at them. They are, briefly, freshly plucked oranges and wat' cocoa-nuts. It is a curious circumstance that, if your negro servant is to be implicitly believed, nearly all the golden fruit of the glorious orange groves, lying freely open to you on your way, is bitter. "Dat bitter orange, massa," says Jem or Sambo, when you mildly desire him to halt and pluck. At last, I bethought me of saying I should like to taste a bitter orange; and then, with some stifled mutterings, my veracious attendant alighted slowly, and brought back a basketful of oranges that were not bitter, but, on the contrary, sweet to the very pips. The wat' cocoa-nut is even more delicious than the freshly-plucked orange. A *water* cocoa-nut, or a cocoa-nut in its youthful tenderness, when outer fibre and inner shell can both be cut through at a chop, and the "milk," falsely so-called, is bright, clear, sparkling, and cold as water from the hill-side, but with a flavour perfectly divine, cannot be imagined by those whose knowledge of cocoa-nuts is bounded by Mr. Treloar's matting and three shies a penny. A negro "swarms" a cocoa-nut tree, more or less willingly, for a quatty or two quatties—silver coinage of the value of three-halfpence each little piece. The manner of swarming, or climbing, is curious. Clasp the trunk lightly, but firmly, with his two hands, and placing the soles of both feet against the tree, he walks up, double, foot over foot, and hand over hand, the toes playing an important part in the business, while the heels stand out far from contact with the bark. My servant, alas, had a wooden leg; so I was beholden to chance-swarming for my wat' cocoa-nuts. By-the-by, no stranger looking at that slender and graceful object, a cocoa-nut tree, seeing how lightly poised is the tall, straight shaft, and how small a space is occupied by the cluster of fruit which nestles coolly beneath the long drooping leaves, split on either side into long sword-shaped pinnæ, would think of guessing the weight of foliage and fruit at anything like a ton. Not merely a single ton, however, nor two tons, nor three, but very often as much as four, will be the weight balanced on that lofty and seemingly fragile stem, at a height of 60 feet. I say, to see this is not to believe it; but it is nevertheless true; and another strange fact about the cocoa-nut palm, easily explainable, it may be, by its endogenous growth, but strange for all that, is that the trunk is the same thickness all the way up; nay, that the trunk of a young tree, a few inches in height, or barely clear of the ground, is of the same diameter as a full-grown palm, bearing the heavy burden of leaves and fruit which has been mentioned. Let the reader look at any readily accessible picture or engraving in which a cocoa-nut tree is shown. A hundred to one he will find it altogether wrong. To begin with, the draughtsman having got into his head that the tall, slender trunk is flexible, gives it what he considers a pleasing curve, something approximating to Hogarth's line of grace and beauty. In reality, this palm is as upright and rigid as a flag-staff. You may see the leaves tossed and torn by a hurricane, while yet the trunk shall not deflect half a foot from its true perpendicular. I have

just opened a volume of Bryan Edwards's "West Indies," which contains an engraving from an original picture by Agostino Brunyas, of a negro festival in the Island of St. Vincent, "drawn from nature"; and I find one of these fancy cocoa-nut palms, bending over with the all but inevitable conventional curve that no real palm ever did or could assume. But this is no worse, perhaps, than a picture I have lately seen of a flock of goats, with teeth in their upper jaws! The ways of painters are wonderful, especially in "drawing from nature."

From Spanish Town, and from St. Catherine's parish, in which that shadow of an ancient city stands, to the parish of St. Thomas in the Vale, the road is beyond question the most beautiful in Jamaica, if not, as many travellers have asserted, in the world. Having used the word "parish," I may as well pause to remark that the parochial divisions of the island are not such as an English vestryman or ratepayer would naturally suppose, a Jamaica parish having as little affinity to a parish in Great Britain as a Jamaica attorney has to that home-grown production, an attorney-at-law. Jamaica is primarily divided into three counties, by name Cornwall, Middlesex, and Surrey. The parishes into which these are subdivided are tracts of country as broad in some instances as the smaller counties of England: St. Thomas-in-the-Vale is not a large parish for Jamaica, but it is, nevertheless, large enough to contain mountain scenery of considerable extent. Its pride of picturesque and romantic loveliness is the long but never-tiring glen called, by a negro corruption as absurd and senseless as any perverted name that ever crept into general acceptance, "the Bog Walk." Originally, and by Spanish lips, this glen of dancing waters, the natural sluice of a winding valley, was called the Bocâgua; and hence Bog Walk. It is a wild, rocky gorge, so exquisitely clothed and adorned with countless forms of tropical vegetation that no poet's dream of fairy-land could outshine its gracefully fantastic splendour. Through its unequal floor of broken rocky masses, rounded and softened in their boldest outlines, rolls and tumbles the bright Rio Cobre, on its way to the sea. This river is formed by the union of the Negro, the D'Oro and many lesser streams; and, seeing how often it divides and breaks up in its pell-mell, helter-skelter course, one might almost fancy that a crowd of little rivers, pressed together but still individual and distinct, ran side by side without actually mingling. I don't know how many times the traveller has to cross this same Rio Cobre in going up or down the Bocâgua or Bog Walk. Perhaps twenty would not be an exaggeration. Now the snake-like stream is on your right, now it glides or dartles by your left hand, now it is on the right again, now it is almost hidden by a cluster of bamboos, graceful giants of the wonderful grass family, some of the tallest rearing their light feathering tops as high as 80 or 90 feet. At the entrance of the glen the hills are low. Quickly they increase in height as well as in steepness, until our road and river, twisting and twining together amid plantain-groves and orchid-covered cotton-trees of stupendous size, and groups of palms that make Chiswick and Kew deserts, not to be thought of without a shuddering chill, lies at the feet of sheer perpendicular cliffs awful to look up at. Flowers there are, such as we

see in sparing array at the Botanical Fêtes, here scattered in such profusion that the buried treasures of Port Royal and all the fabulous heaps of doubloons hidden in pirate-caves would not suffice for prizes to be awarded in this grand flower-show of the Bocágua. Butterflies as big as birds, and birds much smaller than butterflies—so small that if Puck were to rob their nests he might avoid detection by replacing the eggs with caraway comfits—hover about the gorgeous blossoms, and sip the sweets while on the wing. This, as a pure matter of fact, is the habit of the humming-bird, or “doctor-bird,” as a fine variety of the tribe is called in Jamaica. Thrusting his long bill into the calix of a flower, he hovers for a few moments above it, moving his wings so rapidly that they can hardly be seen even to vibrate, and thus causing the sound which is identical with the hum of a bee. No jewels flash rays more resplendent than those which dart from his vivid breast. How pretty looks the same plumage, dead and motionless in a glass case! What then is it living, pulsating against an orchid-bloom, or moving swiftly through the sunlight of the tropics? Simply indescribable. The Bocágua—let us drop that hideous and meaningless cacophony, “Bog Walk”—widens as we approach Mount Diabolo, over which lies our road to the northern coast of the island. Let us halt for a while.

GODFREY TURNER.

(To be continued.)

COMMUNICATION WITH THE PORTUGUESE COLONIES IN ASIA AND EASTERN AFRICA.

A CONTRACT has lately been entered into between the Portuguese Government and the British India Steam Navigation Company to run a service of steamers between Lisbon and the Portuguese Colonies in Asia and Eastern Africa, in order that more regular and frequent communication might be established. The neglected state to which these valuable possessions have been reduced, owing chiefly to the want of frequent and direct intercourse with Lisbon, was much to be regretted. The exceedingly rich province of Mozambique, with which, doubtless, a valuable and extensive trade might have been carried on, was, until recently, dependent on two vessels for communication, which were irregular and uncertain in their voyages; and with Goa direct intercourse was even less frequent. While these provinces were left neglected, regular and frequent communication had been maintained for years past with the Portuguese possessions on the West Coast of Africa, and trade has there consequently increased. The variety of wealth, the abundance of highly valuable products, and the different industries with which the extensive territories of Mozambique could enter into the world's trade are well known; and great credit is due to his Excellency the Councillor João de Andrade, Minister of Marine, in having at last succeeded in establishing regular communication with Asia and Eastern Africa. Now that the new line is opened—the arrival and departure from Lisbon of the first steamer having already been announced—great commercial results may be anticipated; and we doubt not but that the Portuguese Government will shortly be able to congratulate themselves on this act of provident administration.

VOL. II.

Reviews.

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ORIGIN AND HISTORY OF DRUGS.*

IN both soul and body this book is a remarkable example of concentrated labour, knowledge, and thoughtfulness. Taking the body first, nothing in that has been left to chance or mechanical routine. Print, paper, type, binding, all exhibit a notable element in common, we mean *Brains*. The result is a handsome octavo containing upwards of 700 pages of matter excellently printed, with sufficient but no superfluous margin, of very moderate weight, and only 2 inches in thickness, bound to last a century, and needing no application of the paper-knife or its treacherous substitutes. What we call the soul of the book presents an extraordinary repertory of knowledge, accumulated by the experience and labours of two lives, and diligently sifted to the last attainable pitch of accuracy. Chance has given the present writer some scale whereby to estimate the labours of the authors. Under the head of *Manna* the items *Botanical origin, History, and Production* occupy two pages and a half. Yet, he happens to know that the material boiled down to this condensed result embraced among other things not only a large amount of out-of-the-way reading, but a considerable correspondence, and a journey by one of the authors to Calabria and Sicily.

No apology is needed for reviewing this book in a *Geographical Magazine*. To no sort of commerce did early geography owe more than to the trade in drugs; and no kind of goods travelled so far. More apology is needed for the presumption of a layman (in every sense, medically, pharmaceutically, and botanically) in undertaking such a task. At least the fact that the book can so interest such an one is of some weight.

As a layman, then, I somewhat regret the leading title, as tending to limit demand (unjustly) within professional boundaries. *Pharmacographia* will to many suggest much the same idea as *Pharmacopæia*, viz., rhubarb and magnesia, *fiant pilulæ*, and the other old symbolical and wholesome lessons on the bitterness of penitence, which nature was thought to have placed in the way to bodily amendment, at least till homœopathy attempted to substitute sugar-plums and flowery paths.

To such a work we do not presume to come as critics, unless we should venture in closing to nibble a little at etymologies. Rather we draw near, like Sancho at Camacho's wedding, to drop a fork into the well-replenished caldron, and see what luck shall fetch us up.

The drugs are arranged according to the natural orders of the plants from which they are derived; and each article is subdivided into branches, such as *Botanical Origin, History, Production or Collection, Description, Microscopic Structure, Chemical Composition, Commercial Statistics, and Uses*. The last heading is, however, only indicated in the briefest manner, and this seems a thing to be regretted. The *History* has been treated with remarkable care, and this, we

* *Pharmacographia*: A History of the Principal Drugs of Vegetable Origin, met with in Great Britain and British India. By Friedrich A. Flückiger, Phil. Dr., Professor in the University of Strassburg, and Daniel Hanbury, F.R.S., Fellow of the Linnæan and Chemical Societies of London. Macmillan & Co., 1874.

confess, is the heading that attracts us most. Among the articles that we have found stored with interesting facts, we may name—*Aconite*, *Opium*, *Lemon* and *Orange*, *Olibanum*, *Chinchona* (not spelt so, however), *Gum Arabic*, *Cinnamon* and *Cassia*, *Benzoin*, *Camphor*, *Nutmeg*, *Clove*, *Rhubarb*, *Sandalwood*, *Cardamom*, *Grains of Paradise*, *Pepper*, *Ginger*, *Saffron*, &c.

Singular is the obscurity that has persistently hung over the origin of many familiar drugs and spices. This was not wonderful when the commerce in these drugs formed almost the sole links connecting the ends of the earth. Rhubarb and galangal from China and its borders; cloves, nutmegs, and cubebs from the Malay Archipelago; pepper, ginger, and cardamom, from Malabar, passed on to Europe, where the *things* became familiar as household words, at a time when the further end of this chain of commerce was as remote and shrouded as if it had been in another planet. But the obscurity in many cases lasts still, or has lasted till recently. *Olibanum*, or frankincense, forms a striking instance, although in that case the obscurity was due rather to the perverse ignoring of recorded facts than to want of evidence. Though the source of its production had been, from time immemorial, the southern coast of Arabia, and the opposite Sumáli region, yet it was long the fashion to represent this as an Indian product, and Dr. Birdwood's paper in the *Linnean Transactions* for 1868 is believed to have first put the chief facts in a clear light. Jalap, that once familiar abomination, was not traced definitively to its botanical source till 1829 (p. 398). Galangal, which physicked the early Crusaders, and helped to spice the stews of the Plantagenets, is the produce of a plant only identified and described in 1870 (p. 581); the exact species (more than one) furnishing the American Brazil-wood of commerce are, I believe, still unknown; the origin of *Gum Elemi* appears to remain a matter of doubt, though the authors of this book think there is no longer room to question that it is the same as the *Lubán Meyeti* of the Sumáli coast, produced by *Boswellia Frereana* (Birdwood).

Very curious are the notices, which our authors have collected from choice authorities, of the early knowledge of drugs possessed by Egypt and China, those monumental lands of ancient civilization. Thus (p. 250) cloves are mentioned as having been in use in China under the Han dynasty (B.C. 202 to A.D. 220) by courtiers who held the spice in their mouths to sweeten the breath before addressing the sovereign. Cassia bark is mentioned in the earliest Chinese herbal, ascribed to the mythical emperor Shin-nung (p. 468). The same spice is supposed to be recognised in an Egyptian detail of the 17th century B.C., as well as gum imported from Arabia, and known by the name (*Kami*) which we still give it (p. 207). Paintings in the temple of Dair-al-Bahri, in Upper Egypt, illustrate the trade from Arabia in that remote age. In these paintings are representations not only of bags of olibanum, but also of olibanum trees in tubs or boxes, bearing an inscription—"Thirty-one verdant incense-trees brought among the precious things from the land of Arabia, for the majesty of the God Amon, the lord of the terrestrial thrones. Never has anything similar been seen since the foundation of the world" (p. 121).

Now and then, among these historical notices, we find curious examples of that conservatism which is so

strong in normal human nature, in spite of present symptoms the other way. Thus, in 1522, when a Portuguese ship first brought direct by sea to Antwerp a cargo of pepper, and of those other Indian spices, which the great Low Country mart had been accustomed to receive from Venice, the goods were looked upon with great mistrust (p. 521). Again, those devoutest of believers in monopoly, the Hollanders, who extirpated the clove-tree in its native islands, in order to restrict the supply, used to kiln-dry their nutmegs before exportation, and then break the shell and steep the nut in milk of lime, all to prevent the possibility of germination on foreign soil. This liming had no other object, was quite needless even for that, and spoiled many nuts. But the prejudice in favour of these *limed* nuts was so great in some countries that the Penang nutmegs, which were not originally subjected to such a process, had to be limed in London, in order to fit them for re-exportation (p. 454).

As a specimen of the interesting matter to be found in this book, we had marked for extract, the sections on the *Origin* and *History* of Cloves, but our space does not permit the extract of two pages, and matter already so carefully condensed and digested admits of no abridgment.

Ibn Batuta, veracious as to events, but apt to be inaccurate as regards natural phenomena, gives a most incorrect, though curious, account of the clove: "What is imported into our country (he says) consists of the wood (or twigs); what the people of our countries call the *Flower of Clove* consists of those parts of the flowers which fall, and which resemble the flowers of the orange tree. The fruit of the clove is the nutmeg, which we know as the *sweet* (or aromatic) *nut*. The flower (envelope?) which forms thereon is the mace. And this is what I have seen with mine own eyes."*

The *twigs* here spoken of may be either a mistaken reference to some kind of cinnamon or cassia, or may be the *clove-stalks*, which were a familiar article in the middle ages under the name (in Italy) of *Fusti di gherofani*, and the like.† Our authors (p. 255) tell us that these clove-stalks are still a considerable object of trade from Zanzibar; but, apparently, only to use in the adulteration of the *ground cloves* sold by grocers. The fact that mace is an envelope of the nutmeg‡ seems to have given rise to a long enduring popular belief (to the truth of which the Moorish traveller here gives partial testimony) that the clove was the flower of the nutmeg-tree, and the cinnamon its bark. I was once asked if it were not so by a native friend in Upper India. Bodæus, in his commentary on Theophrastus (1644), takes occasion to contradict this fancy; and in the narrative of Mr. Funnell (*Dampier's Voyages*, 1707, iv., 261), we read:—"It is the commonly received opinion that cloves, nutmegs, mace, and cinnamon, grow all upon one tree; but it is a great mistake."

The *names* of the clove in western languages are divided between such as indicate its resemblance to

* *Voyages*, avec trad. par Desevemy et Sanguinetti, iv., 243.

† It appears, also, from a note of Lee's that there was a spice bark known as *Kirfat ul-Karanful*, or clove-bark.

‡ Sir John Maundeville, whose science was better than his veracity, says simply and rightly:—"And wytethe wel, that the Notemuge benethe the Maces. For righte as the Note of the Haselle hath an Husk withouten, that the Note is closed in, til it be ripe, and afre fallethe oute; righte so it is of the Notemuge and of the Maces."

nails, and such as are corrupted from the ancient *Caryophyllum*, whatever be the true origin of that. Even the Chinese call it *ting-hiang* or nail-spice (p. 250), and the Spanish and Portuguese *clavo*, *cravo*, Dutch *Kruid-nagel*, German *Gewürtz-nagel* or *nelke* ("nail-kin") follow suit. The Italians take up *caryophyl* in all the variations that they delight to play on their liquids, *garofalo*, *garofano*, and so forth. The French combine the two in their *Clous de Girofle* or *gillofre*, from which was taken the old English *Clove Gillo floure*, which has again been divided, assigning the clove to the spice, and "gilly-flower" to a familiar clove-smelling plant.*

Obscurities perplex the endeavour to trace the history of drugs in time as well as in space. When the article is tracked back to the earliest occurrence of the name, doubts almost always arise as to its really indicating the same article. Take the cassia and cinnamon of Herodotus, the *caryophyllum* of Pliny, the cardamom of Theophrastus. Long disquisitions have been printed in past days as to whether these were the articles still known by the same names. The like questions constantly arise in relation to ancient geography; and in that field the present writer's conviction is that the traditional nomenclature has been, as a rule, faithful; e.g., that the *Sinae*, the *Iabadin*, the *Zaba* of the ancients indicate the China, Java, and Champa of modern times; and he would be apt to apply a like presumption to the nomenclature of drugs, making allowance for inaccurate description in both cases. But there are some remarkable exceptions even in geography. For instance, it would be rash and wrong (though it has been done) to identify the ancient *Gandaritis* with the modern Candahar. And in pharmacography it seems certain that *Cassia fistula*, a name now and for centuries applied to a laxative pod, was in the time of Galen a cinnamon-like spice-bark (p. 195); and that the *Cinnabar* of Dioscorides, instead of being an ore of mercury, was the resin called Dragon's-blood (p. 609); whilst the *Macer* of ancient writers is regarded by our authors as certainly not mace, but the bark of a Malabar tree, which in modern times has the same reputation as a remedy for dysentery† (p. 451).

Our authors adopt the derivation of *Ginger* (*Zingiber* or *Zinziber*) from a Sanskrit name of the spice, *Sringavera*, i.e. "horn-shape." Mr. Burnell, however,‡ has expressed an opinion that this is only a Brahminical corruption of the Dravidian name, which he supposes, for reason given, to have been anciently *sinchi*-, or *chinchiver*, represented now by Malayalim *inchi* or *inchiver* (for the Tamul tongues drop sibilant letters). If the Brahmins, "striving after meaning" in their own tongue, made this into *Sringavera*, the Arabs on the other hand appear to have imagined a connection with *Zinj* or *Zanzibar*, and to have called *Ginger* "the plant of *Zinj*" (see *Reinaud's Abulfeda*, i., 207, and *Kazwini*, in *Gilde-meister, de Rebus Indicis*, p. 218). In Marino Sanudo's map of the world also (circa 1320), largely founded on Arabic sources, we find a rubric connecting *Zinziber* with *Zinj*. I cannot, however, find *ginger*

anywhere spoken of as a product of Eastern Continental Africa, though Barbosa says a large quantity was produced in Madagascar, and Varthema says the like of the Comoro Islands.

In treating of sugar our authors say:—"An old Sanskrit name of Central Bengal is *Gura*, whence is derived the word *Gula*, meaning raw sugar, a term for sugar universally employed in the Malayan Archipelago, where, on the other hand, they have their own names for the sugar-cane, though not for sugar" (p. 651). But surely there is some inversion here. The Sanskrit word in question (*guda*, Hindustani *gur*), for sugar in its first ungranulated stage, would seem from the Dictionary (William's, pp. 290, 300), to mean primarily "a ball or lump"; then the ball or loaf of such sugar; and from this would come *Gauda Desa*, "the sugar country," for Central Bengal.

It is very difficult to realize a time when sugar was not the familiar standard of sweetness, and curiously reads Pegoloth's classification of the chief sweets of the middle ages, as *mele d'ape*, *mele di cannamela*, *mele di carrubo*, viz., bee-honey, cane-honey, and carob-honey. The last of these is, I suspect, the origin of *caramel*.

But in thus expatiating and digressing regarding what is but one branch of the mass of knowledge in this book, we do no justice to its more scientific aspects. That we must leave to others better qualified, but we cannot doubt that they will indorse our hearty praise.

H. YULE.

Cartography.

:o:

British Admiralty Charts.

SINCE our last notice (*Geographical Magazine*, 1874, p. 211,) a large number of Admiralty Charts has been published, amongst which there are several of general interest.

The shifting sandbanks along many parts of the British coast, irrespective of the changes wrought by the construction of new docks and harbours, lighthouses and beacons, necessitate occasional revisions of existing charts, and even partial re-surveys, and we need hardly add that a comparison of the old charts with these new ones throws great light upon the geological changes ascribable to the action of the sea. Of new charts three have to be noticed. The first* is a new edition of Sheet 3 of the east coast of England, based upon the surveys made by the late Admiral Washington and others, with additions by Captain J. Parsons, up to 1873. The topographical detail of the interior has been taken from the Ordnance Survey, and we only wish the officers of the latter would return the compliment, and insert upon their maps of coast districts the interesting features to be derived from the Admiralty Charts. A combination of this kind is very much to be desired, and would obviate the necessity, in numerous instances, of consulting two sets of charts. Indeed, a map which ignores the configuration of the sea-bottom, or confines itself to merely giving the high and low water-lines, most certainly fails in conveying an adequate notion of the physical geography of a country.

Captain Parsons likewise furnishes us with a capital plan of Folkestone Harbour, and, indeed, of the whole town up to the railway viaduct, from a survey made in

* In Gerarde the clove pink is called *Clove Gillofloure*, and the stock "*Stocke Gillofloure*" or "*Gillouer*."

† Called by the Portuguese *Arvore Santo*, and by the native Christians "*Tree of St. Thomas*."

‡ *Indian Antiquary*, vol. i., p. 352.

* 1630. England: East Coast. Sheet 3. Orford Ness to Crommer, 1:152,166. London, 1874. 2s. 6d.

1873.* The third chart† referring to the British Islands gives an elaborate delineation of Menai Strait, surveyed by Captains J. H. Kerr and H. R. Harris in 1872.

Crossing over to Continental Europe, we meet with charts of the coast of Sweden, between Nidingen and Hönö,‡ and including the approaches of Götheburg, and of the gulf of Bothnia.§ The former is based upon a Swedish chart published in 1869, the latter is a compilation from Russian and Swedish surveys which, contrary to the practice of the British Admiralty surveys, confine themselves to a delineation of the coast, and eschew inland features, including even prominent hills which might serve as landmarks to the mariner. In connection with Scandinavia may be mentioned a very fine chart of the south-western portion of Iceland,|| which is based upon the Danish Survey of 1855, with additions from Bjorn Gunnlangsson's map (1849), and the French survey of 1859. This chart gives a very detailed delineation of the interior of the country.

From the extreme north of Europe we at once pass into the Mediterranean in order to notice a chart of Corsica,¶ based upon a survey by Captain Hell, of the French Navy (1824), with corrections to 1871. The whole of the interior has been filled up, and if the same attention had been bestowed upon this portion of the chart as upon the delineation of the nautical features, we should now be in possession of the beau-ideal of a map of this island, equally serviceable to the mariner as to the tourist. The requirements of the former certainly do not call for a detailed delineation of the interior of a country. He would be content with an indication of the principal towns, of the summits of mountains and other prominent objects, available as landmarks. But if the Admiralty once takes upon itself to fill in the interior—a most commendable practice, especially in the case of islands—the same care ought to be bestowed upon this portion of the chart as upon the coast-line.

A companion sheet presents us with plans of Ile Rousse, Centuri, Bastia, Florent Gulf, Calvi, Porto Vecchio, Algajola, Porto Bello, Galeria, Campo Moro, Ajaccio, Port Bonifacio and Pinarello, all from the latest French surveys.

Before quitting Europe we notice a chart of Kerch Strait,** principally from French surveys made in 1853, and corrected up to 1873. A marginal map shows Kerch and the adjacent coasts on a smaller scale (1:142,000), and is mainly based upon Russian surveys published in 1872.

From Europe we proceed to Africa. Captain Nares supplies us with a chart of Porto Grande,†† on St. Vincent, one of the Cape Verde Islands, surveyed in 1873, which is an exceedingly fine specimen of engraving. Captain R. C. Downer, of the merchant service, furnishes sketches of the embouchures of the rivers Opobo and Quabo, in the bight of Biafra.‡‡ The third sheet §§ contains a chart of Cape Amber and vicinity, from

* 1991. England: South-East Coast. Folkestone Harbour. 1:4,860. London, 1874. 1s. 6d.

† 1464. England: West Coast. Menai Strait. 1:24,300. London, 1874. 3s.

‡ 196. Sweden. Nidingen to Hönö. 1:50,000. London, 1874. 2s. 6d.

§ 2252. Gulf of Bothnia. 1:730,000. London, 1874.

|| 2733. Iceland, South-West Coast. Portland to Sheffels Jökul. 1:270,000. London, 1874. 2s. 6d.

¶ 1131. Mediterranean Island of Corsica. 1:252,000. London, 1874. 2s. 6d.

|| 126. Mediterranean. Ports and anchorages in Corsica. London, 1874. 2s. 6d.

** 9205. Black Sea. Kertch Strait, 1:142,000 and 1:35,500. London, 1874. 2s. 6d.

†† 370. Cape Verde Islands. St. Vincent. Porto Grande. m.=4 in. London, 1874. 1s. 6d.

L ‡‡ 628. Africa, West Coast. Plans in the Bight of Biafra. London, 1874. 1s.

§§ 676. Madagascar. Ports and anchorages in the vicinity of Cape Amber. London, 1874. 1s. 6d.

Captain W. F. W. Owen's old survey on a scale of 1:181,400, and plans of Port Ambavarene (Lady Frances), from a French survey made in 1848 (scale 1:43,200), and of British Sound (scale 1:50,000) from the surveys of Owen, and of French officers up to 1865. Finally, we have to notice a very complete chart of Perim Island,* and of the strait intervening between it and the mainland of Arabia, for which we are indebted to Lieutenant F. J. Gray, and the other officers of H.M.S. 'Nassau' (1874).

The surveys made by officers of the 'Challenger,' under the direction of Captain Nares, are successively being published. We have already noticed a chart of Porto Grande. In addition to this there are charts of Prince Edward, Heard, and Macdonald Islands,† surveyed by Captain Nares, and of Crozet Island, by Lieutenant Fourrier, of the French Navy, with soundings added by the former, as well as a chart of Kerguelen Island.‡ The latter has been compiled from a variety of authorities, from Kerguelen (1772), and Cook (1776), up to Captain Nares, but the chart, nevertheless, is still very incomplete. No doubt, on the return of the parties stationed there to observe the transit of Venus, we shall be furnished with an exact map of this interesting island, which, on account of its remoteness and lack of commercial importance, would probably have remained unsurveyed for many years to come except for this fortuitous event.

The cartography of Australia has been enriched by a capital chart of St. Vincent and Spencer Gulfs,§ from surveys made by Captains J. Hutchinson and F. Howard, in 1863-73, and by another of Port Curtis,|| the intricate channels of which have been carefully laid down by Captain P. B. Bedwell and Lieutenant E. R. Connor in 1871-72.

Captain Moresby gives a further instalment of his labours in New Guinea, consisting of plans of Port Moresby and Fairfax Harbour,¶ surveyed by Lieutenant Mourilyan in 1873. The Solomon Islands to the east of New Guinea will be found delineated on a chart** based upon the labours of D'Eutrecasteaux, Dumont d'Urville, Krusenstern, H. M. Denham, and others, supplemented by information furnished by Messrs. Kerr and Tilley, members of the Melanesian mission. But in spite of this formidable array of authorities there yet remains a great deal to be done by future explorers before a satisfactory map can be produced.

The annexation of the Fiji Islands and the consequent stay there of British vessels has naturally led to the production of some new charts, which do not, however, add much to our previous knowledge, as derived from Denham, Wilkes, and others. Lieutenants H. Hosken and J. W. Brown, of H.M.S. 'Pearl' (Commodore J. G. Goodenough), have surveyed Nadronga Harbour,†† and revised Lieutenant G. E. G. Jackson's chart of Mbau Roads (1867), whilst Lieutenant Hosken supplies us with a sketch of Goro Island.‡‡

Passing to America we meet with a plan of Port San Juan, Porto Rico, from a survey by Don Evaristo de

* 2592. Red Sea. Perim Island. 1 m.=4 in. London, 1874. 1s. 6d.

† 802. Islands in the South Indian Ocean. Prince Edward, Crozet, Heard, and McDonald. London, 1874. 1s. 6d.

‡ 2398. Indian Ocean. Kerguelen Island. 1:292,000. London, 1874. 2s.

§ 2389. South Australia. St. Vincent and Spencer Gulfs. 1:304,000. London, 1874. 6s.

|| 1900. Australia. Port Curtis, Queensland. 1:36,500. London, 1874. 2s. 6d.

¶ 2126. New Guinea; South Coast. Port Moresby and Fairfax Harbour. 1:24,200. London, 1874. 1s.

** 214. South Pacific. Solomon Islands. 1:1,043,000. London, 1874. 2s. 6d.

†† 176. Viti Levu. Nadronga Harbour and Mbau Roads. London, 1874. 1s.

‡‡ 162. Fiji Islands. Goro Island. 1:912,950. London, 1874. 6d.

Churruca, published by the Spanish Admiralty in 1872.* The officers of the Chilian Navy furnish us with a number of plans of great interest, which supplement existing charts, and ought certainly to be consulted when constructing a map of that portion of South America. These plans, seventeen in number, are collected on three sheets. The first of these† contains anchorages in the Chonos Archipelago, viz., Ports Lagunas, Yates, Perez, Tangbac, Nevado, Chacabuco, San Miguel and Harchy Bay, from surveys made 1870-71. The second sheet‡ supplies us with plans of Port Calbuco, Huito Inlet and Reloncavi Inlet, in the Ancud Gulf, surveyed in 1871. The third sheet§ gives plans of Port Yañez, Lamehuapi Cove, Milagro Cove, Muicopue Cove, Ranu Cove, and Condon Cove, surveyed in 1872. This activity of the Chilian Navy is most commendable, and we trust will culminate in a systematic survey of the entire coast from the Tierra del Fuego in the south to the frontier of Bolivia in the north. A further addition to the geography of Chili has been made by Lieutenat Lecky, of the Royal Naval Reserve, in command of the Pacific Steam Navigation Company's steamer 'Auráucanian,' who supplies us with a chart of Port Tongoy,|| in latitude 30° S. New editions of charts 1278 and 587 have likewise been issued. Plans of Patillos Bay and Pabellon de Pica have been inserted in the former, and of San Jose Roads in the latter.

An index sheet of the charts of the east coast of North America¶ will prove useful for reference.

In conclusion we ought to state that the whole of the Admiralty charts have been engraved for some time past by private firms, that they are equal in execution to the maps issued formerly, when a staff of engravers was specially employed upon them, and that by this arrangement the public undoubtedly effects a saving without detriment to the quality of the work turned out.

Stanford's Map of Metropolitan Improvements.**

THIS map has come to be published regularly every year on the opening of the Parliamentary Session, and supplies information which must interest every inhabitant of London. The improvements and public works to be sanctioned this year are not perhaps as numerous as in former years, but are, nevertheless, of considerable importance. New railways 20½ miles in length are to be constructed, of which the Eastern Metropolitan, which will connect the inner circle with the eastern suburbs, is the more important; the Victoria Docks are to be extended, and several gas works are to be erected on the outskirts of the metropolis. These, as well as improvements sanctioned during former sessions, are shown in red and blue on the map before us, which likewise gives existing tramways and railways, and is, in fact, a full and carefully drawn map of the British Metropolis.

E. G. RAVENSTEIN.

* 478. West Indies, Porto Rico. Port San Juan. 1: 10,900. London, 1874. 1s 6d.

† 1328. South America: West Coast. Anchorages in the inner channels of the Chonos Archipelago. London, 1874. 1s.

‡ 567. South America: Ports in Ancud Gulf. 1: 40,000 and 1: 140,000. London, 1874. 1s.

§ 1281. Anchorages on the coast of Chili. 1: 20,870. London, 1874. 6d.

|| 809. South America: Chili, Port Tongoy. 1: 73,000. London, 1874. 1s.

¶ N. Index sheet, East Coast of North America: Florida to Labrador. London, 1874. 6d.

** A new map of Metropolitan Railways, Tramways and miscellaneous improvements, deposited at the Private Bill Office, November 30th, 1874, for Session 1875. London, 1875.

Log Book.

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The Arctic Expedition.—The names of the two ships have now been decided upon. The 'Alert' will retain her old name, and the 'Bloodhound' will be the 'Discovery,' which is the name of the little vessel in which Baffin discovered Smith Sound. The following is the list of officers of the Expedition:—

H.M.S. 'ALERT.'

<i>Captain</i> . . .	George S. Nares, F.R.G.S.
<i>Commander</i> . . .	Albert H. Markham, F.R.G.S.
<i>Lieutenant</i> . . .	Pelham Aldrich.
" . . .	A. A. Chase Parr.
" . . .	G. A. Giffard.
" . . .	W. H. May.
<i>Sub-Lieutenant</i> . . .	George Le C. Egerton.
<i>Surgeon</i> . . .	Thomas Colan, M.D.
" . . .	Edward L. Moss, M.D.
<i>Assistant-Paymaster</i> . . .	Edgar de H. Whiddon.
<i>Engineer</i> . . .	James Wootton.
" . . .	John Pitt.

H.M.S. 'DISCOVERY.'

<i>Captain</i> . . .	Henry F. Stephenson.
<i>Lieutenant</i> . . .	Lewis A. Peaumont.
" . . .	Robert H. Archer.
" . . .	Wyatt Rawson.
" . . .	Reginald B. Fulford.
<i>Sub-Lieutenant</i> . . .	Crawford J. M. Conybeare.
<i>Surgeon</i> . . .	Belgrave Ninnis, M.D.
" . . .	Richard W. Coppinger, M.D.
<i>Assistant-Paymaster</i> . . .	Thomas Mitchell.
<i>Engineer</i> . . .	James Melrose.
" . . .	George White.

The officers have commenced their special studies. Two in each ship will make themselves masters of magnetic work, two will take up the pendulum, two will be initiated into certain enquiries in astronomy, and one will take charge of investigations connected with spectrum analysis. Collections will be diligently made in zoology and botany; but it is very important that a geologist, well acquainted with all Arctic geological questions, should accompany the expedition, and this point has not yet been decided. Results of the utmost value will thus be secured in every branch of science, and, whether the season of 1875 be favourable or not, success is, humanly speaking, within the reach of the gallant young officers who are fully resolved to secure it. Pole, or no Pole, the exploration of such an area within the unknown region as was covered by the sledges of former expeditions, is success.

The Cession of Fiji and Commodore Goodenough.—In our number for May 1874 (page 57) we gave an account of the Viti or Fiji Islands, and a map. Since that time the joint Commissioners, Commodore Goodenough and Mr. Layard, have submitted their report, and the cession of this important group to the British crown has been accepted. The report of Commodore Goodenough is an exhaustive and admirably arranged public document, which has not only been of great use in deciding the questions connected with the cession of the islands, but which will continue to be most valuable hereafter for purposes of reference. It is a store-house of carefully sifted facts and well considered opinions, prepared in answer to a series of questions from the Colonial Office; while the appendix contains an estimate of Fiji revenue and expenditure for

1874-75, a statement of the public debt, statistical tables, and an important note on the tenures of land. In the debates on the cession of the Fiji Islands, which took place in the House of Lords on the 17th of July and in the Commons on the 4th of August 1874, a spirit of factious opposition on one side and a want of intelligence on the other led to this admirable report being spoken of in a way which is very discreditable. It was misquoted, falsely quoted, and jeered at. For instance Mr. Lowther alleged that the Commissioners sought to commit the Government, without further enquiry, to the acceptance of the Fiji debt, and that they suggested terms of cession which were inadmissible. They did nothing of the kind. They simply transmitted complete information, in accordance with their instructions.

Commodore Goodenough may well despise these misrepresentations. The character of that distinguished officer for accuracy and thoroughness in all that he undertakes is too well known to be affected, in the slightest degree, by the unthinking and ill-considered speeches of politicians. Nor were his services in connection with Fiji confined to the preparation of a lucid report. He preserved order for many months, collected accurate information, and prepared the way for annexation with remarkable tact and judgment. Among the names most honourably connected with the first page of the history of the new colony, that of Commodore Goodenough will always stand first. Fiji became a British Colony on October 10th, 1874.

The Unsurveyed World.—On the 1st of February Staff-Commander Hull, the Superintendent of Charts at the Admiralty, read a very interesting and important paper on the condition of the naval marine surveying service before the United Service Institution. He stated his objects to be the arrest of decay in the charts of our ocean highways, and the advocacy of more activity in the surveying branch of our navy. His paper was illustrated by a chart, so coloured as to depict the present state of hydrography, the coasts coloured red being surveyed, those coloured blue being partially surveyed, and the brown shade, covering a large portion of the globe, showing coasts which have been merely explored but not surveyed. Commander Hull began by calling attention to the surveys at present in progress. The 'Shearwater' (Commander Wharton) and the 'Nassau' (Lieutenant Gray) are at work on the east coast of Africa, south of Zanzibar, where a fine harbour has been discovered by Navigating-Lieutenant J. Dixon. The 'Sylvia' is ordered to survey the southern coast of the Japanese Island of Nipon, the survey being executed by Captain St. John, and his able assistant, Navigating-Lieutenant W. Pearce. On the coast of England, Staff-Commander John Parsons and two assistants, with a hired crew, have been closely sounding the approaches to Harwich, in the 'Porcupine,' and the shores from the South Foreland to Dungeness, as well as Dover Bay in close detail. Staff-Commander Hull, during 1873, made a minute examination of the bar at Portsmouth Harbour. On the east coast of Ireland, Staff-Commander Kerr and two assistants, in a hired steamer, have made a patient examination of the shoal banks near Wicklow Head, the bar of the Liffey River, and Wexford and Kingston Harbours. Navigating-Lieutenant Millard is continuing the survey of the north

coast of Sicily, on which Commander Wharton was engaged in the 'Shearwater' before he was detached to Zanzibar. In the West Indies Commander George Stanley and one assistant, in a hired schooner, have been engaged on the south coast of Jamaica; and Navigating-Lieutenant William Maxwell, in the hired steamer 'Gulware,' has been actively engaged on the coast of Newfoundland. There are also special surveys being executed in Australia; while Captain Moresby has recently combined important discoveries with good surveying work at the eastern extremity of New Guinea.

After recapitulating the surveys that are actually in progress Commander Hull went over the vast extent of unsurveyed coast, and showed what an enormous amount of work remained to be done, and how low the surveying service had been brought down. In July 1873, including the 'Challenger,' there were thirty-six surveying officers employed, of whom only four belonged to the main branch of the service, namely one captain, one commander, and two lieutenants. Commander Hull then compared this deplorable falling off with the state of things in 1849, under Sir Francis Beaufort, when there were twelve surveying vessels in commission, and twenty-three officers on separate duty, besides Arctic ships. There were seventeen captains and twelve commanders. The paper then gave some account of the work in the Hydrographic Department, which is also overladen and overworked, and where the accommodation for drawing and arranging the charts is a disgrace to the country. In conclusion Commander Hull said—Finally, I entreat you all to let this branch of Her Majesty's service be so well recognised, as a useful element in the empire, that it shall be in some measure protected from those blasts of ruinous economy which periodically sweep over our country; remembering that, from its first establishment, the surveying service has been *second to none* in placing and maintaining the Navy of Great Britain in its prominent position among the forces of civilization.

Journey up the Yang-tse-kiang to Yunan.—Mr. R. A. Margary, an energetic young Member of the China Consular Service, is making his way up the Yang-tse-kiang River with the intention of meeting the Yunan Expedition under Colonel Browne, and Mr. Ney Elias, which has been recently despatched from the side of British Burmah.* He has travelled by boat from Hankow, and purposes to follow the line of the great Yang-tse to the entrance of the Tung-Ting Lake. Crossing its broad waters he will enter the river (Yuen-kiang?), which flows in at the south-west angle of the lake, and passing Chang-teh he will continue up the stream to the borders of the province of Quei-chow. There navigation will end, and the land journey commence in chairs over the magnificent passes of that mountainous province, and after twenty-five days travelling he anticipates reaching Yunan-fu. Foreigners are rarely seen, and Mr. Margary has been much mobbed in consequence. He at last ventured to remonstrate with a crowd that was following him, and was agreeably surprised by their soon dispersing. His opinion is that it is the nature of Chinamen to give in to anything which asserts superiority. "A kick and a few words

* Vide *Geographical Magazine* for January, p. 22.

in his own tongue, telling him he is an ignorant boor, will make a common Chinaman worship you." He describes the river as winding through marvellous gorges and crammed full of rapids (200 large ones having already been passed), while for miles it passes only the stations of wood-cutters, who form rafts out of fir trees (which grow in the greatest profusion about), and erect pine-wood cottages on them for the crew, who thence convey the timber to Hankow. Mr. Margary is travelling with two of the Yunan authorities, and this has proved of great advantage to him, though some delay has been occasioned thereby. He expects to reach Yunan-fu by the 30th of November, and looks forward eagerly to meeting Colonel Browne and his party.

The New High Priest of Urga.—Journey from Lhasa to Urga.—Through the quelling of the Tungan insurrection affairs are now comparatively quiet on the north-west frontier of China, and this has enabled the new *Kutuktu** or high priest of Urga in Mongolia to make his solemn progress thither from Tibet, the cradle of the Lama priesthood. This ecclesiastic, according to the *Journal de St. Petersburg*, is of the very tender age of six, and he is the eighth representative of the hierarchical dignity he holds. The office is elective within certain Tibetan families resident close to the abode of the Dalai Lama at Lhasa, and to that of the Rinchin bogdo at Teshoo-Lumbo, and the election is conducted by the *Amba* or Governor of Lhasa, the Dalai Lama, the Viceroy of Tibet, and other authorities. Before setting out for Mongolia, the young priest was educated under the jealous supervision of Tibetan teachers for two years at a monastery about 3 versts from Budali, the residence of the Dalai Lama. Towards the close of last May the mission set out from Lhasa, journeying as far as Koko-Nor on horses and yaks and in carts, and beyond that point making use of camels and horses, the number of the former being no less than a thousand, and the latter twice as numerous. The Deputy-Governor of Lhasa, accompanied by his secretariat, started some ten days later; but owing to ill-health, was unable to catch up the mission. From Sinning, as far as the province of Alachan, the party were escorted by troops, but previously, while journeying close to the Khara-ussu River, they had had to secure a free passage by buying over the chiefs of an independent tribe of mountaineers, called Golok. The province of Alachan is situated at the angle formed by the Yellow River; and a reference to the map will show that this lies somewhat to the east of the direct route from Lhasa to Urga, but the deviation was unavoidable, owing to the complete devastation by brigands of the country westward. On approaching the Khalka provinces, crowds of pilgrims issued forth to meet the mission, prostrating themselves and bringing presents, and at the frontier itself the party were received by the Chadzobda, or chief of the high-priest's future retinue, and other high officials. On the 30th of October the entry into Urga took place amid great pomp and rejoicing, but the *Kutuktu* was not formally installed in his palace for two days, and took up his position instead in what is termed his yellow country house, being an enclosure of yellow stuff, surrounding seven

felt tents. Around were grouped the tents of numerous princes and chiefs, and outside a large assemblage of Mongols. The Tibetans were anxious to avoid entering by a certain gate, which had been the scene of several executions, but by raising a cry that the ice was giving way just as the crossing of the river was being effected, the Governor managed to cause a hurried entry into the city by the gate referred to. The installation of the *Kutuktu* in his palace was a solemn affair. He crossed the square in front of the palace on horseback, the oldest chiefs of the Khalka States holding the bridle; at the door he was received by the civil authorities, and a grand service in the temple followed. During the ensuing days more solemn services, festivities and public games took place, and it is in contemplation to celebrate a fresh round of them during next summer. A great impulse has been given to all commercial dealings, which had been paralysed for the last few years owing to the death of the former priest and the troubled state of the country.

New Work on Natural History, etc., of East Turkistan.—The Government of India have arranged to publish an illustrated work on the Geology and Natural History of Eastern Turkistan, founded chiefly on the observations and collections of the late Dr. Stoliczka, who accompanied the recent mission to Kashgar and Yarkand, and died on his return homeward. The work will be in some sense commemorative of Dr. Stoliczka, and in accordance with a plan he had himself sketched out for the publication of his memoranda. Dr. Day and Mr. A. O. Hume, C.B., will edit the parts relating to fishes and birds, respectively; while Mr. W. T. Blanford will take up the subjects originally selected by Dr. Stoliczka himself, viz., geology, mammals and reptiles, and Mr. Wood-Mason, of the Indian Museum, the crustacea and insects. It is anticipated that the book will form a most interesting and unique memoir on the natural history and physical geography of the distant and little-known regions to which it refers.

A Geographical Society in Egypt.—The Khedive, ever intent upon developing the material resources of his dominions, has charged Dr. G. Schweinfurth with the formation of a Geographical Society, which, like that of Russia, will enjoy a *quasi* official character. The Society is to direct the exploratory expeditions which it is proposed to send to the most remote parts of the ever-increasing territories acknowledging the sway of Egypt: it will trace out new roads of commerce, supply scientific observers with instruments, and promote the cause of science generally. The Egyptian General Staff, presided over, as it is, by several of the most experienced American officers, will prove a useful auxiliary to the Society, and has already furnished the *personnel* for an expedition despatched for the exploration of Dar Fur and the countries to the south of it. Dr. Schweinfurth is eminently fit for the task with which he has been charged. His fascinating volumes, *The Heart of Africa*, prove him not only to be an enthusiastic explorer, but likewise an able naturalist and careful observer of human nature.

We learn that Dr. Nachtigall, the German traveller, has returned from his extensive journeys a martyr to rheumatism. He is now using the sulphur water of Heluan, and purposes to return to Europe in May.

* See the *Geographical Magazine* for 1874, p. 7.

Proceedings of Geographical Societies.

ROYAL GEOGRAPHICAL SOCIETY.

Meeting of the 25th of January, 1875.

THE GORDON EXPEDITION.

THE President, SIR HENRY RAWLINSON, took the chair at 8.30 P.M. He informed the meeting of the safe arrival at Gondokoro of Lieutenants Watson and Chippendale, R.E., who it will be remembered left England last summer to join Colonel Gordon's Expedition as surveyors. Colonel Gordon, in a letter to Sir Henry, dated the 18th of November, reported that these gentlemen were then testing their instruments preparatory to their important journey, in conjunction with M. Linant, another member of the Expedition, who was under orders to proceed to the "Somerset" Nile of Speke, and Victoria Nyanza. On a previous occasion Sir Henry had informed the Society that he had applied for and obtained the sanction of His Highness the Khedive to communicate to them the geographical results of this great enterprise. It was gratifying to learn how heartily His Highness had entered into their views, for Colonel Gordon had stated in the same letter that he had been ordered by the Khedive to send Sir Henry duplicate copies for the Royal Geographical Society. Although it was wise not to be too sanguine in their expectations of events in a region so full of difficulty and uncertainty as Central Africa, he thought they might safely look forward to early and important intelligence from Colonel Gordon and his staff.

The Rev. JOSEPH MULLENS, D.D., Foreign Secretary of the London Missionary Society, then read a paper

ON THE CENTRAL PROVINCES OF MADAGASCAR.

Dr. Mullens said that the chief physical feature of Madagascar was the central mountain mass, which commences with lofty hills at its northern extremity, and retains them till within a moderate distance of its southern cape. This mighty mass is by no means uniform in its appearance. Ascending from the eastern coast to the capital, the traveller meets and successively passes three lofty mountain-walls, each supporting a broad terrace behind it. The first and lowest meets him at two days' distance from the coast: the second lies behind, two days further off, near the forest-station of Beforona: over the third he climbs by the lofty pass of Angavo, and then finds himself on the broad plateau of Imerina, the dwelling-place of the ruling tribes. On the western side also the terraces exist, and are descended one by one, though they are not so grandly marked as on the east coast, and are more easy to travel. From Imerina to the north-west, along the line of country followed by the two principal rivers, four special descents are seen, each being about 800 feet, and each having a distinct pass. The line across these passes is the line of the ancient tribal raids, and along which the present military posts are established.

On the east side of the island the three walls converge on a common point toward the northern districts. In the Sihánaka Province two higher lines meeting beyond the Alaoutra Lake, in latitude $16^{\circ} 40'$, were seen; and the wild sea of hills resulting shows the grandeur of the forces employed in shaping their present form. Away to the south the terraces keep distinct, until they are crossed, in latitude 22° , by a strong range which runs from west to east, when they come to an end, and fall into that level plain swept by the south-east winds, on which M. Grandidier found new shells and bones of Sinbad's celebrated birds. The terraces seem to be between 30 and 40 miles wide, and are far from level. Strong winds, heavy storms of rain, waterspouts, torrents, have cut deep channels in the sandy red clay, which has been deposited among the gneiss rocks which form

the basis of the island; and as these hills and cuttings follow largely the northerly set of the granite ranges, the water seeks an outlet in the sea, in a maze of red hills. On the west side of Imerina the red hills are even more conspicuous. A country so continuously hilly as Central Madagascar, Dr. Mullens had never seen in all his wanderings in the United States or in the Eastern world.

The principal portion of the central plateau is occupied by the plain of Imerina and its southern continuation the Betsileo Province. At its north end this plain is bounded by the mountain mass of Andringitea, and the hills of Manga and Molangána. On the east it begins above the Angavo Forest, and goes westward to Ambohiveloma and Itasy, where it falls into the western plains. In this part the province has a breadth of 90 miles, and a nominal length of 110 miles. Eastern Imerina is pierced by granite hills, and ranges more or less high, which bear upon their shoulders barren moors, swept by the hard east winds. The south has been greatly affected by the volcanic disturbances. It has few fertile spots, and its population is scattered and thin. The thoroughly cultivated parts of Imerina are spread over a space of 50 miles by 25: about 1250 square miles in all. Even here the level is not perfect. Low ridges of red clay run across the plain, generally from the west and north-west toward the south-east: and it is on these, and on isolated portions of them, that are built the numerous villages and towns.

Bordered by grand hills of varied forms, and studded with hundreds of villages and towns, Imerina is in many respects one of the most beautiful and picturesque provinces of Madagascar. Here it is gay with the brilliant green of the young rice; there it is shaded with dark patches of wood around Námehana and Ilafy. Here it shows the great turtle-head rock of Ambátomaláza, or the lofty towers of the Three Sisters; there the long slope of Fandravásana, the lofty peaks of Antogona, or the towering masses of Ankáratra. Here lie the broad waters of the Queen's Lake, with its little island embowered in trees; there stand conspicuous clusters of villages, with their neat huts, the green ramparts of Ambohídrapeto, or the towering amontana tree of Ambohídatrimo.

Over all the higher portions of Madagascar, and far into the lower plains, the chief constituent element was gneiss or granite. Whole ranges of it appeared on every side, and the enormous gneiss boulders scattered over the hill sides formed a conspicuous feature of the landscape. The central province of Madagascar has been the scene of volcanic eruptions on an enormous scale. Twenty miles to the south-west of the capital is a fine group of mountains, the lofty peaks of which stand conspicuous in fine weather against the clear blue sky. These are the Ankárat Mountains, which cover a space of 600 square miles. From the Imerina Plain, 4500 feet high, the traveller rises steadily to 6000 and 7000 feet before he reaches the foot of the great central peaks. These occupy a space of 54 square miles, and are five in number, with minor elevations around them. Their heights range from 8000 to 8950 feet, and are the highest mountains in the island. They are all of volcanic origin, and though no distinct craters were seen, it was observed that they were covered with broken lava. Near their feet on the east are other centres of volcanic outflow and great lava hills. On the south these streams run out for 25 miles. On the west and north also the long tongues of lava can be traced far into the plain, the lava and the clay lying distinct side by side.

In the neighbourhood of Lake Itasy, 40 miles west of Antanánarivo, and 25 miles beyond the central mass of Ankárat, new traces of volcanic agency were found, and from a lofty hill, overhanging the western end of the lake, numerous craters were seen, some of which were of an enormous size. In the midst of the group were little lakes and pools of water; and one charming piece of water, Lake Kazamba, Dr. Mullens believed had

never before been seen by an Englishman. Lake Itasy, which is on the eastern side of these volcanoes, had been formed by the elevation of the land and the outflow of the lava streams. At the western end it looked shallow; and the ground around it was very swampy. Towards the east, where its chief feeder runs in, the water is deep. It is not a ravine, with some natural barrier at its lower end, but a submerged level. Many streams flowed into it from the country round, and it has only one outlet, on the north, through the northern portion of the volcanic district. The lake is 8 miles long and 2½ miles broad; it contains six little peninsulas jutting into the water, one of which is called *Ambonihazo*, "wooded hill." In Imerina the higher plateau has a breadth of 80 miles; but journeying south, Dr. Mullens found it growing narrower. At *Sirabé* its breadth was 60 miles. All down the *Betsileo* province it narrows still; and at *Imahazony*, on the line of 22° S. latitude, on the top of *Kirianga*, both bordering lines of hill on east and west, were seen 35 miles from each other; and the ridges immediately to the south crossed the country like a lofty wall, covered with forest, and fairly united the two. The *Betsileo* province, so far as seen by the travellers was clear of volcanic influence, but contained long gneiss and clay ridges, which cross it from N.N.W. to S.S.E. Near *Fianarantsoa* these ridges lie close to one another, with but narrow valleys between; and in certain localities the massing of the mountains was very grand. On travelling from that town southward, near the little village of *Ambalavao*, some noble masses overhang to the west, while the grass on the lofty eastern hills was all on fire, and long curving lines of flame served both to show the form of the hill and to light up the darkness of the night. On the east is an enormous hill of gneiss; a few miles further to the south-east, where the forest ridge begins, is another mass nobler still, called *Ambondrombe*, which is believed to be the entrance to the spirit world. On the west again the hills seemed to increase in vastness and in number. Within the plateau were the noble rounded hills of *Iandrainsákai*, the high peak of *Iody*, the curving ridge of *Kirianga*; while outside them all, on the edge of the plateau, was the lofty, serrated granite ridge of *Kipaseha*, stretching away to the southward for 30 or 40 miles. The vast bay formed by these wonderful mountain masses contains the broad green plain of *Ambohimandroso*, rich in rice, and supporting a large population.

The *Betsileo* Province had many features of grandeur and beauty about it; but its fertile and well-cultivated spots are few. It contains five districts:—*Ambositras*, *Ambohinamboarina*, *Isandra*, *Ilalangina*, and *Iarindrano*. In the political survey of the country, it is usually described as within the *Matsiatra* or beyond the *Matsiatra*. The *Matsiatra* is its principal river, and it is well fed by numerous streams, which rise from the granite and gneiss hills. The water is abundant, and very pure. The most southern district is termed "*Iarindrano*" (full of water), and well deserves its name. It has one special river, the *Manartarana*, which rises in the hill of *Ambondrombe*, and makes its way sluggishly across the clay plains to the west, until it finds an outlet north of *Iandrainsákai*, whence it falls into the *Mozambique Channel*. Smaller rivers, like the "*Ranofotsy*," join one or other of these. The chief feature of cultivation in the province is rice; and the ingenuity with which the peasantry appropriate the water to its sustenance deserves high praise.

The population of these two principal provinces of the island, *Imerina* and the *Betsileo*, with all their districts, may be estimated at 1,700,000.

The journey from the capital to the *Silianka* Province, 100 miles to the north, was next described by Dr. Mullens. In its general structure it was found to be a vast basin in the midst of hills, with a clear lake and enormous swamps in the centre. The hills cross the country in parallel ridges at an angle of N. 16° W. The

water was still high in the basin, and on three sides touched the foot of the hills; in consequence, whenever they passed from one ridge to another, they had first to wade through the swamp lying at the foot. For miles upon miles in the open centre, as well as up its many arms, the swamp was beautifully green. Two water-plants grow profusely there, the *Zozoro*, a solid triangular papyrus-reed, 16 feet high; and the *Herena*, a flat sword-blade, which reaches 6 or 8 feet. In the centre, though lying nearer to the eastern shore than the western, is the lake of *Alastra*, which is 37 miles in length and 4 or 5 broad. The population of the entire district was estimated at 40,000. The district was about 60 miles in length by 35 in breadth.

The last journey was also over a country perfectly new. The direction traversed was N.N.W., which is the course taken by the *Ikiopa* and *Beteiboka* rivers, into which the province of *Imerina* is to so large an extent drained. It extended a distance of 230 miles, and occupied Dr. Mullens and his party sixteen days.

The descent by this route from the plateau of *Imerina* to the level of the sea is, in its upper portions, more gentle than on the east coast. Four or five broad terraces may be reckoned over which the road passes; the fall in the ground is moderate from one to the other; and the path, as a whole, was found to be one of the easiest in the island.

The first portion of the journey traversed the district of *Vonizongo*, which lies north of the parallel hills among which the *Ikiopa* runs, and is shut in by the great gneiss ridges of *Lohavohitra* and *Ambohimango*. The southern portion of *Vonizongo* is full of valleys cut out by the streams from *Lohavohitra*, and is rich in water and its offspring, rice. The north has high, bleak moors, among which are several beautiful valleys.

Descending the moors by an easy pass over a red clay ridge, the travellers went down into North *Vonizongo*, a valley 25 miles long. Enclosed by two lines of hills, east and west behind these hills, are broad clay moors, scored in all directions by the running waters, and all drained directly or indirectly to the west and north. At the north end of the western line of hills is a noble hill of gneiss, *Angávo*, which Dr. Mullens described as one of the boldest precipices he had seen in Madagascar. The waters had circled around it down the valley, and had cut out a vast bay in the clay deposits at its feet.

On one of these clay hills is the pass of *Ambatomena* (red rock), which gave them a second descent of 800 feet on to the second terrace. This terrace was 48 miles long and had a steady fall to the northward. It presented two parallel valleys drained by a stream, called "the wooded river" (*Mánankázo*), with great hills on the west; and it contained in a line five little towns, which are the *Hova* military posts. These posts serve, (1) to maintain communication with the country to the north; (2) to protect the cattle herds which feed on the unmowed pastures; (3) to ward off the possible attacks of the *Sakalava* tribes who must enter North-West *Imerina* by this road. The people were found to be hospitable and kind, and very glad, in their extreme isolation, to welcome a friend. Toward the north of this section there were some noble hills; one of which, *Andriba*, separated two level and fertile basins, containing several villages, and presenting some beautiful clusters of the *rofa-palm*. Between *Kinajy*, the first of these posts, and *Malatsy*, the last, the ground had fallen 1350 feet.

Dr. Mullens and his party had now finished the inhabited country, and were on the edge of a broad district, literally "*Noman's-land*." It took them two long days to cross this uninhabited country, which was about 50 miles in width. It was perfectly wild; and presented to them long ridges, falling lower and lower, and becoming fewer, trending off to the north-east, and leaving a broad, rich plain close to the sea. It gave them long valleys, grassy green with small vegetation, and well watered by small streams. In the afternoon of the second day they reached *Mevatanána*.

They were now approaching the sea-level: from this point their barometers fell 310 feet. Bembatooka Bay was yet 85 miles away; but the stream was rapid till they met the tides. For the remainder of the journey canoes were hired. At the end of the first day they reached the junction of the Ikiopa and Bedsiboka rivers, and pitched their tents on the sand-bank thrown up when the rivers were full. The spot was full of interest. In their travels among the Imerina Hills they had traced and mapped many of the head-waters from which these rivers had sprung. In the moor, near Angavokely, they had seen the fountains of the Mánanára, the Tsárá-sáhatra, and the Ikiopa; in the forest were the springs of the Varahina and the Sisaony; on the east of Ankarat were the Katsaoka and the Andromba. They had traced them over large tracts of country: here their junction was seen, and their united streams would bear them to the sea. The country was in general level, but it was covered by a few ridges through which the river cut its way. It was fresh and green everywhere. The air was warm and the vegetation largely tropical. Around them were grassy plains, gardens of plantain-trees, abundance of reed, and of the bamboo-cane with its spring leaves and feathery crown, while great tamarind trees, huge mango trees, or a few palms, stood out upon the undulations, or shared in the forest which clad the dark hill sides. More animal life was seen than in any other part of their travels. There were numerous small birds of gay plumage, blue and green; large flocks of wild ducks, small flocks of the paddy bird, the little white stork; now a heron flew up from the green brake; now was seen the flamingo fishing in the stream. But nothing could compare with the crocodiles. From the time they took to the canoes they began to see them—first in twos and threes, then in sevens and tens; at one time families of ten and twelve, and even twenty, were grouped together, sleeping in the sun; and at last, spread over a spit of land, no less than forty were found. They are timid, and, when woke up from their lazy sleep, at once hide themselves in the water. They watch cleverly for the cattle when they come to drink, and they are destructive also to human life.

The rich and fertile district now crossed was occupied by a portion of the Sakalava tribes. They are not numerous; their villages are small and scattered. They live on fish, on rice, on their cattle, and on the produce of their plantain gardens. They have few wants, and there is little trade. Mevatanána is the first of seven Hova towns, which are really military posts; they lie in a line along the river, and end at the port of Mojangá. Dr. Mullens saw five out of the seven, and was most hospitably welcomed. At Mojangá he and his party were picked up by the steamer 'Malacca,' which had recently continued the line from Zanzibar and Nosibé, and soon found themselves on the way to Zanzibar and home.

The Malagasy people who inhabit the island are a single race; they are divided into three principal tribes, occupying different districts. After referring in detail to these tribes, Dr. Mullens, in conclusion, said that as a people the Malagasy were not far advanced; their almost complete isolation from the world at large had greatly retarded their progress. They were thoroughly tribal in all their institutions still. They are clans in form, as well as in spirit. The prince was their chief, officially the owner and lord of all they had and all they were. All obligations were paid by feudal service; officers were remunerated by lands, and by the assignment to them of the service of so many inferior men. No salaries had been paid in money till recently; everything had been paid in service or by gifts in kind. The hump of every bullock killed belonged to the queen. Things were far behind, but they were a kindly people, an orderly people, a loyal people. They had a great affection for their queen, and the queen—who was an excellent Christian lady—had a warm affection for the people. An intelligent people,

they had learned much from their English friends, and were improving daily. There were more than a thousand congregations among them; some three hundred thousand of them were more or less under instruction; and many thousands proved by their example that they were not only intelligent but sincere.

In the discussion which followed the reading of this paper Sir BARTLE FRÈRE said that what he had himself seen of the north-west of Madagascar impressed him with the conviction that it was one of the most beautiful parts of the earth. He did not think anything in India could compare to the great bays of Bembatooka and Passadava, and the mountain masses to the north which were visible from the sea-coast: while Johanna, one of the Comoro Islands was certainly one of the most lovely spots he had ever seen. With respect to the fauna and flora of that part of the world, he said that they were of the greatest possible interest, for remains were found of plants, birds, and beasts which must have existed in the great continent, of which no historical records have been preserved. He regretted that there was not that interest taken in Madagascar that was manifested even so far back as the reign of Queen Anne. He then spoke of the beneficial influence which the teaching of the missionaries had upon the religious education of the islanders, and he was glad to say they were fast becoming a civilized people.

Meeting of February 8th, 1874.

THE President, Sir HENRY RAWLINSON, took the chair at 8.30 P.M. His Royal Highness the Prince of Wales, Mr. Ward Hunt, and Vice-Admiral Hornby were present, and the crowded audience included many naval officers and men of science.

The members of the Arctic Expedition, who were present were Captain Nares, Captain Stephenson, Commander Markham, Lieutenants Aldrich, Parr, Giffard, May, Rawson and Fulford, Sub-Lieutenant Egerton, and Dr. Colan.

The old Arctic officers present were Admirals Collinson, Ommanney, Richards, and Sir Leopold M'Clintock; Captains R. V. Hamilton, Moore, and Nares; Mr. Clements Markham, Mr. J. Biggs, Dr. Lyall, and Dr. Ede.

THE ARCTIC EXPEDITION OF 1875.

SIR HENRY RAWLINSON said that the crowded state of the meeting, and the attendance of so many distinguished persons, testified to the warm interest that was felt by all classes in Arctic discovery, which was the subject of the paper about to be read to them that evening. Perhaps, under such circumstances, before they proceeded to the regular business of the evening—that of calling on Admiral Richards for his paper—it might be as well if he said a few words by way of introduction. He ventured to remind the meeting that the Royal Geographical Society took some credit to itself, and, he thought, with justice, for the share which it had taken in launching that great undertaking of the Arctic Expedition. In spite of opposition, in spite of discouragement, in spite of indifference, the Royal Geographical Society had always worked long and energetically in keeping this one object in view. At length they had succeeded—and it was only fair now that they had succeeded, that those gentlemen who had borne the brunt of the battle should be merited accordingly. He would, in the first place, mention that throughout they had received from Admiral Sherard Osborn every assistance. That gentleman was to have been present that evening, but they had to deplore his absence owing to domestic affliction. Captain Osborn, now just ten years ago, read a very interesting paper, in the course of which he pointed out the advantages of attempting to reach the North Pole by way of Baffin's Bay and Smith Sound, at the same time giving many valuable results which might be hoped for in any future expedition, dwelling more especially on the advantages to be derived from the training of naval

officers for Arctic services. In another paper, read by this gentleman in 1872, he advocated an Arctic Expedition; and both in speaking and writing, whenever an opportunity offered, he invariably urged this, and it was mainly owing to his efforts that the British public had been educated to understand the scientific and national advantages to be derived from a Polar Expedition. Then, too, there was Dr. Hooker, the President of the Royal Society, who, in 1865, pointed out the botanical results which would follow an Arctic Expedition; and he, in conjunction with Admiral Osborn, waited on the First Lord of the Treasury, and urged the necessity of a scheme to effect this purpose. Dr. Hooker had throughout been most zealous; but no persuasion could have induced Her Majesty's Government to send such a large body of men and officers to the Pole had not a young naval officer, Commander Markham, proceeded, in 1873, in a steamer northwards to test the power of steam in overcoming the difficulties of Arctic navigation. His cruise was perfectly successful, and he passed from place to place with complete ease; and it was mainly owing to the graphic account he gave of the cruise that the public mind was disabused of the great danger of navigating the Arctic Sea. It was by the aid of this gentleman, and fortified as they were by that scientific and practical authority, that they were enabled to go to the First Lord of the Treasury, and lay their case before him. Sir Henry Rawlinson took this opportunity of recording on the part of the Royal Geographical Society and, he believed, of science, the enlightened views held by the First Lord of the Treasury with regard to the matter, and he at once took upon himself the duty of laying the matter before the Admiralty. The Admiralty appointed a committee, composed of the *élite* of the Arctic naval officers, to consider and organise the expedition, which committee consisted of Admiral Richards, Sir Leopold M'Clintock, and Admiral Sherard Osborn, who were a guarantee that the arrangements with regard to the expedition would be fully carried out. Two vessels, the 'Alert' and the 'Discovery,' were to be sent out by the Government, and were now being prepared for the expedition. A very excellent body of officers had been selected for these vessels, whilst the supreme command had been placed in the hands of Captain Nares, who had not only had experience in Arctic discovery, but had actually travelled a distance of some 1500 miles upon ice. Added to these qualifications, he had had great experience in naval matters, and latterly he was in command of an exploring ship, the 'Challenger.' It was not too much to say of him that he was one of the most accomplished officers of the naval service. With regard to the scientific arrangements of the expedition, their indefatigable secretary, Mr. Clements R. Markham, proposed that the Royal Geographical Society should publish a manual giving all the information with regard to other expeditions, for instructions and reference, which should be accompanied with reprints from other languages relating to the subject, the whole to form a manual of Arctic geography, and this manual was now in active preparation. As to the actual preparations now going on at Portsmouth, they were being well carried out by Sir Leopold M'Clintock, and it was no doubt a great advantage that this department should be placed under the care of such a man, who was unrivalled in experience of such a character. A zoologist, too, had been appointed; and he trusted that before long a geologist would also be appointed, and in this he had been warmly seconded by *Nature*, which had urged the necessity and importance of a geologist to accompany the expedition.

Admiral RICHARDS then read his paper

ON THE ROUTE TOWARDS THE POLE, FOR THE ARCTIC EXPEDITION OF 1875.

AFTER a few introductory remarks, Admiral RICHARDS said that the Society had persisted through long and

weary years, and under much discouragement, in urging the revival of Arctic discovery, and perhaps to no individual were they so much indebted for success as to their Secretary, Mr. Clements Markham. Arctic enterprise had always been popular in this country, and had the same attractions for Englishmen as those Eldorados of Mexico and the Indies held out to our Southern neighbours. He would not inquire too closely into the cause of this, but doubtless honour and ambition had their share. He always thought a good deal of misapprehension existed in the minds of many intelligent persons, and of the public generally as to the position we have occupied in regard to Arctic exploration during the last half of the present century. As a matter of fact, we had not sent out any exploring expeditions for the last 30 years, nor had they made any serious attempt but one to reach the Pole, and that was Parry's attempt in 1827, by Spitzbergen. His previous series of brilliant voyages, including that of Franklin in 1845, in the same direction, were revivals of the old furor to accomplish the North-West Passage. Had Franklin returned moderately successful, his expedition would have been followed by a similar one in the direction of the Pole; but owing to the unfortunate results of this voyage, it wearied out the nation, and it was not to be wondered at that, so far as this country was concerned, Arctic enterprise slept for so long a time. But still some peril must always be incurred in a new enterprise, and the sacrifice in this case was large because the experiment was a great one. It was perfectly well understood why the crews of the 'Erebus' and 'Terror' perished; but they had learnt much since that time, and it was impossible that, to a certain extent, the same dangers would arise as formerly. No service whatever, he was of opinion, was more faithfully carried out than the search for Franklin. The commanders of these expeditions had a delicate task to perform, and each did his best, according to his ability. There was no clue to follow; all went westward, and so far as they knew, that was the right direction; and but for the discovery by Dr. Rae, in that memorable journey which he undertook in 1854, the fate of these men might have remained a mystery still. Aided by its own instincts, M'Clintock and his companions finally solved the mystery, and the details of the voyage of the little 'Fox,' fitted out by Lady Franklin, were too well known to require further comment.

The experience of other Arctic explorers would now, Admiral Richards thought, stand them in good stead. It has been decided, and he thought wisely, in the interests of science, to say nothing of the interests of the country, to despatch a well-equipped expedition to endeavour to reach the highest northern latitude, possibly the Pole itself. The route proposed was the channel leading north from the head of Baffin's Bay, the southern entrance of which was known as Smith's Sound; and this route offered such a great advantage over all others because the course was a straight one from the entrance of Davis Strait to the 82° of N. latitude. The entrance to Smith's Sound was discovered and named by Baffin in 1616, when he sailed round the sea or bay which bore his name, and there was no record of its being visited until two centuries afterwards, when Ross and Parry passed its entrance. No people had shown a greater interest in Arctic exploration than the Americans, and when all further hopes were abandoned by the English in the direction of the North Pole, the restless and enterprising spirit was among them, and they persevered for years till they accomplished results which must be admitted by all to have been at least unsurpassed. Amongst eminent discoverers were the names of Kane, Hayes, and Hall.

After alluding in detail to the explorations of these explorers, Admiral Richards went on to say that, with regard to Smith's Sound, its longitude and the accurate delineation of its shores mattered little; all that they were concerned to know was that it was found to be a

navigable channel for ships; and it was the route which it was supposed the expedition was to follow. With respect to the character of the expedition, the vessels were of an excellent character, over 700 tons, and were furnished with steam power, and were now being fitted out at Portsmouth, under the superintendence of Sir Leopold M'Clintock. They had been made as strong as wood and iron could make them, and they had been fitted as no expedition had been fitted in this country. The crew of each ship consisted of about sixty officers and men, and they would carry provisions and store of coal for a period of at least three years. These numbers might appear small to those uninitiated in such service, but only ships of a certain class could navigate the ice in safety, and the necessity of carrying provisions, &c., for so long a period, rendered it absolutely necessary to reduce the mouths to a minimum. There had been appointed three ice-men to each ship, the remainder of the crew being men-of-war's men. As one of the objects of the voyage was scientific research, a former precedent had so far been departed from that a skilled naturalist was to be squeezed in each ship, and instruments and appliances of investigation of every branch of science would, no doubt, be provided. Arrangements, too, had been made for the supply of about sixty dogs, to be shipped on board at Greenland, for the purpose of drawing the sledges, and it might be interesting to know that several tons of the choicest dog biscuits would be provided for them. He confessed some doubt whether the biscuits would be properly appreciated, for his own experience was, that they preferred to eat one another.

In the ordinary course of things the two ships would leave Portsmouth about the latter end of May or the beginning of June, and take the usual route of Baffin's Bay, where they would endeavour to pass up Smith Sound. Here, probably in 81° or 82° N. latitude, if such a position could be reached, one ship would leave the other, and if so the remaining one would find plenty to occupy the explorers in 1876 in the exploration of the north coast of Greenland, and here the ship would probably remain for further orders. Admiral Richards presumed Captain Nares would endeavour to push northwards in his own ship, and they might be certain that should the two ships winter apart, they would use their best exertions to communicate with each other in the spring of 1876, and there was no reasonable doubt but that they would be able to do so.

The exploration to the north would be limited by the Pole, not 500 miles from the assumed position of the vessel of the second in command, and the exploration by ship east and west would be circumscribed; when it is added that part of the design is that a ship shall visit Smith Sound in 1877, should the expedition not have previously returned, it will, I think, be admitted, that all which human foresight can devise, will have been done to insure success, and to secure safe retreat. Although, however, we may not forecast, we may be permitted to speculate on the nature of the land or sea which lies beyond the 82° parallel, though, perhaps, we shall be treading on delicate ground.

We know that, from the Polar area included between the meridian of Spitzbergen on the east, and Melville Island on the west, a constant current or drift sets to the southward, through Smith Sound, through Wellington Channel, and the channels west of it, through Peel Sound, and Prince Regent's Inlet; that it sweeps with great violence through Hecla and Fury Straits, and also through Hudson Strait, and down the coast of Labrador. This is the current which forced the ice on King William's Land, and prevented the release of the 'Erebus' and 'Terror,' which carried the abandoned 'Resolute' out of Barrow Strait into the Atlantic, and which, in the month of July or August, annually clears the ice out of Smith Sound, unless some local conditions should combine in an unfavourable season to prevent it. The inference I draw from these and other circumstances is,

that there is no continent or great mass of land in the Polar area north of Greenland or the Parry Islands, and it is somewhat strengthened, though, perhaps, not materially, by the fact that Sir Edward Belcher, in his voyage, saw no land to the north, from a considerable elevation on North Cornwall, neither did his travelling parties in their journeys westward in about the same latitude.

At any rate, on the existence or absence of continuous land to the north of Smith Sound, or of an archipelago, such as the Parry group, must depend the operations of a ship after leaving this position. If navigable water, or partially navigable water is found, it is possible that short work may be made of reaching the Pole; if continuous land is found, along the shores of which sledges can travel, a very high latitude, or, probably the Pole, may be reached in this way; but if continuous land, or nearly continuous land, is not met with, all Arctic travellers know that the distance to be accomplished by sledges and boats combined is a very limited one. I should not wish to be misunderstood in this remark. Travelling by boats alone during the autumn, when there are occasional leads of water, and before the young ice has begun to make in September, is not difficult, nor so dangerous as ship navigation.

It is quite certain that no great and noble enterprise of this kind can ever be sent forth without resulting not only in material advantage, but without adding greatly to the sum of human knowledge, and so advancing the cause of truth.

A very few words more. Some of those who have been the strongest advocates of Arctic discovery have, perhaps unconsciously, been led to underrate or make light of the task which lies before the leader of this expedition. I may have been among the number myself; but it is very certain that, under the most favourable conditions, skill and perseverance in no ordinary degree, and the united efforts of all, will be necessary to ensure success, even moderate success; and it is equally certain that conditions have been met with, and may be met with again, which will baffle all human skill, and defy all human effort. Nothing is so uncertain as ice navigation: the best laid schemes may be frustrated, and a whole season lost, by the accident, for instance, of the wind hanging in a particular quarter for a couple of days during a critical time.

No human effort can force a ship any distance through a solid floe of ice, any more than she could be forced through the crust of the earth. If she cannot reach within such a distance of the Pole as will enable the journey to be accomplished by travelling parties in a given number of days, then success, so far as reaching the Pole is concerned, will not be obtained; but I am very far from thinking that the success of the Expedition depends on reaching the Pole, or even a very high northern latitude.

Mr. WARD HUNT (First Lord of the Admiralty) said the Expedition had his best wishes for its success. No pains had been spared at the Admiralty to equip it in the best possible way, and to select as the leader and officers those in whom thorough confidence could be placed. He felt deeply indebted to those experienced Arctic voyagers who had consented to take upon themselves the arrangements for the Expedition, and was perfectly certain that everything would be done that could be done to render the Expedition worthy of this country. Admiral Richards had warned the Meeting not to expect too much, and that advice had been well given. If the results did not prove to be great, there would at all events be the satisfaction of their having done their very best; but he felt confident that the results would, in a scientific point of view, be very valuable, and would greatly increase the knowledge of the physical nature of the globe. No doubt there were risks to be encountered, but they were not such as to deter Englishmen from pushing forward maritime discovery, or from going to whatever part of the world they were sent by their Queen and Government.

Admiral COLLINSON observed that it was greatly to be regretted that the Expedition would not have the advantage of the experience of the voyage of the 'Erebus' and 'Terror.' Unfortunately the journals of Franklin's Expedition had not been recovered. All that was known was that they reached 77° to the northward of Cornwallis Island; but this showed that the ice to the northward of Parry Archipelago was more in motion than it was further south. If the new Expedition came upon a firm impenetrable body of ice, such as existed between Melville Island and Banks Land, their progress would be entirely stopped. He was, however, pretty well assured that by following the land, and not turning a corner, they would get further north than had ever yet been attained.

Admiral Sir LEOPOLD M'CLINTOCK said the success of the Arctic Expedition would depend mainly on the sledging. The ships, it was hoped, would reach 82°, where the Americans reached two years ago. They would then be within about 500 miles of the North Pole. If such ice was there met with as was commonly found in Lancaster Sound, the Expedition would, without doubt, reach as far as the Pole. The system he himself had adopted for sledging was to break up the ship's company into parties of seven or eight men, each with an officer. A tent and a sledge were provided, and six weeks' provisions could be drawn along at the rate of about 12 statute miles a day. That would enable them to travel something like 600 miles—300 miles out and 300 back; but if several sledges were put on the same line of route, and sent back as they were emptied, it was clear that one sledge could advance greatly beyond 300 miles. If the land proved to be continuous, depôts of provisions would be sent on in advance. The ground then would have to be travelled over as quickly as possible to the most northern depôt, where the sledges could be filled up, and a start made for the Pole. The object should be to make the equipment as light as possible, so that the provisions taken might be the more. Besides the sledges to be drawn by the men, the new Expedition would have five or six sledges to be drawn by dogs. His own experience was that two dogs would drag as much as one man. They did not eat so much as a man, they required no clothes or cooking, and altogether it was much more economical to have dogs than men. On his last Expedition he had twenty-four dogs, and without them he should not have been able to do one-half of what he did accomplish. It was wrong to attempt to house them; they would live near the ship all the winter. If they were housed or treated differently from what they had been accustomed to, they would get sick and die. About 120 men would be sent out in the two ships, and with about 60 dogs he thought they would be able, by dividing themselves into about a dozen parties, to cover about 8000 or 10,000 miles of ground, and that would be doing a great deal. Temperature had very little to do with travelling. The moment there was sufficient light the travelling should commence.

Captain VESEY HAMILTON believed the Esquimaux dogs to be the most ungrateful creatures in creation. He on one occasion travelled several hundred miles with only one companion, and his duty for six weeks was to feed the dogs; but a week after he left them they would not recognise him in the least. During the winter they were supplied with food only once a week, but they ate their companions that died. Dogs were most useful in keeping up communications between the depôt ship and the other parties, but for unknown ground he preferred men.

Admiral OMMANNEY said that Englishmen must be grateful to their American cousins, who had cleared the way by successive years of exploration in Smith Sound, and had shown that the parallel of 82° might be reached. From that point, as a base, sledge parties would no doubt be able to attain very important results. He was glad to hear that the equipment of the Expedition was in such good hands as those of Sir Leopold M'Clintock,

who was his (Admiral Ommanney's) first lieutenant when he discovered the first traces of Franklin.

Mr. CLEMENTS R. MARKHAM said he had been requested by the father of Arctic voyagers, Sir George Back, to express his disappointment at not being able to be present on this occasion to wish God speed to those officers who were now about to sail for the regions within the Arctic Circle. The work of the expedition would be to explore as large an area as possible of the unknown region, every part of which teemed with interest in all branches of science. The Pole, after all, was only a point, without length, or breadth, or thickness, and had no special interest in itself; and if the officers of the expedition equalled or excelled the work of Ommanney and M'Clintock, in 1851, or of M'Clintock, and Meham, and Hamilton, Richards, and Osborn, in 1853, they would achieve complete success whether they reached the Pole or not.

Captain DAVID GRAY (introduced by a few remarks from Captain Henry Toynbee) said he saw, in his whaling cruise of last year, an open sea north of Spitzbergen, in 80° north. He wished to know how those gentlemen who advocated the Smith's Sound route accounted for the great rise and fall of the tide there, with southerly winds, and the open water said to have been seen by the 'Polaris.' At the Duck Islands, on the south side of Melville Bay, the rise and fall of the tide was 5 feet or 6 feet, while in Smith Sound it was about 18 feet with southerly winds. The only way in which he could account for this was by supposing that Smith Sound was merely an inlet in which the water became banked up. No clear water could exist where it was said to be seen by the 'Polaris' if there was any connection with the Polar Sea, because the tide would bring the ice down. If, however, the tides met at Cape Fraser, then Smith Sound must communicate with the Polar basin. He had navigated the east coast route for the last thirty years, and could frequently have sailed north as far as he liked, without let or hindrance, and if the expedition failed to reach a very high latitude by Smith Sound, he hoped they would go round and try the east coast.

Captain NARES said he had frequently been asked how he would use the compasses on reaching the North Pole? The answer simply was this, that the Magnetic Pole being situated at a considerable distance from the Pole of the Earth, there would be no difficulty to overcome in that respect. One of the chief causes of depression to those who wintered in the Arctic Seas was the long continued darkness. During the summer the sun shone continuously for 66½ days, north of the Arctic Circle, but in the winter it disappeared altogether below the horizon. At the Arctic Circle itself it merely just touched the horizon on the shortest day, giving three or four hours' twilight, but at the Pole there would be 182 days' darkness. The increase in the amount of darkness from the Arctic Circle to the Pole was very rapid. In latitude 75° there were 95 days of darkness, and on the shortest day the sun did not reach nearer than 8½° below the horizon. For about five months they could read the *Times*, when it was held up facing south. Where the 'Polaris' wintered in 82° they were 138 days without the sun, and for three months out of that time they would be in perfect darkness. In latitude 85° there would be 153 days of darkness. There was one counterbalancing point however, namely, that whenever the moon was above the horizon she was in her full during an Arctic winter, while in summer she was always in her first or second quarter. When Admiral M'Clintock spoke of having 53 days' provisions on a sledge, he meant at one time, but the party would be away 106 days, 53 days out and 53 days back, during the whole of which time it would have to depend entirely upon its own resources, without assistance from anybody else in the world. If a person started from London, went up the East Coast of England, then round Edinburgh, down the lakes of Cumberland, through Wales, and back to

London again, without calling at a public-house or speaking to a soul, he might have some notion of what Admiral M'Clintock had done. Captain David Gray had touched upon the two vital points with regard to Smith Sound. That Sound was either a *cul de sac* with the tide rushing up and increasing as it advanced, or the tides met at Cape Fraser, and the Expedition would then be able to go through.

The PRESIDENT, in concluding the discussion, said it was one of the great privileges of the Geographical Society to be able to introduce to the notice of the public matters of current interest, such as that which had been brought forward this evening. He wished, in the name of the Meeting, to express the great gratification they felt at His Royal Highness the Prince of Wales having been pleased to show, by his attendance on that occasion, the great interest he took in Arctic discovery. Such an event could not but be equally gratifying to the officers of the Expedition, who he trusted would, during the next three months, on many occasions renew their visit to the Society.

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BERLIN GEOGRAPHICAL SOCIETY.

THE most prominent article in the *Verhandlungen* or "Proceedings" devoted to the meeting of the 7th of November, is a careful review, by Dr. Roth of Dresden, of the Abyssinian, Red River, Khivan and Ashanti Expeditions, more especially with reference to the sanitary arrangements. He points out with good reason that the extreme care with which in the last case the entire campaign was compressed into the brief period before the rains, must be attributed the wonderful freedom from mortality of the troops, a fact contrasting most favourably with the disastrous results of 1826.

In the records of the meeting of the 5th of December we find a short memorandum by Dr. Bastian on the projected journey of Captain Von Homeyer, of the German African Association, into the interior of Africa by way of Cassandye and Muata Yambo, a route which Dr. Bastian thinks will prove practicable, as it is known to have been traversed by certain Portuguese travellers, and more recently by Livingstone. Herr Hildebrandt gives an account of his travels, in 1872, along the west coast of Arabia, and in Abyssinia. At Aden, Hildebrandt was forced into quarantine for ten days, and during this period his discomforts, pent up as he was in a small vessel under a burning sun, were many. He much prefers the way they manage these things in the Turkish ports of Arabia, where an officer comes on board and proclaims aloud that every passenger must hand over a dollar or undergo twenty days' quarantine. Hildebrandt crossed over to Massowa, where he was invited by Muzinger Pasha to make a tour with him into North Abyssinia. He first paid a visit to the Buri Peninsula, where he could trace the former existence of a volcano from the lava streams radiating from the cone. During the rains vegetation springs up so quickly in the intervening plots of ground, that even elephants find plenty of sustenance there. Some hot springs were also discovered, proving that volcanic agency is still at work. Hildebrandt paid a visit to the salt plain of Regad, which is about two days' journey in length and one in breadth, and which lies 200 feet below the sea level. The salt deposits are accounted for in two ways, one theory being that the sea formerly extended to the foot of the Abyssinian mountains, which bound the plain on the west (a fact borne out by coral deposits and sea-shells still visible), and that through volcanic action the Arrata Hills were upheaved, and thus shut in a lake which eventually dried up, leaving a crust of salt. The other theory is that the salt has been annually brought down from the lake of Aolebodd by two streams, the Kibreale and Arrata, and this appeared to Herr Hildebrandt to be the likelier of the two. The salt is carried away for consumption on the backs of women, and of camels, asses, and mules: is used also as

currency, and is thus a synonym for wealth. From a plain to the south, of still greater depression, there rises a mountain called Oerteale, from the summit of which thick clouds of smoke issued. Herr Hildebrandt could find no allusion to this on the part of other travellers, and therefore concludes that he is the first discoverer of an African volcano. He ascended to the edge of the crater, in spite of the dissuasions of the natives, who assured him that the mountain was haunted by spirits and demons. On regaining the coast, he embarked on a dhow, and visited Assab Bay, the former settlement of the Italian Rubattino Company, since ceded to Egypt, who lays claim to all the western shore of the Red Sea. The French have endeavoured to organise settlements first at Edd, then at Shech Said opposite Perim, and last of all at Hobok Bay, with the idea of facilitating trade with South Abyssinia, Schoa, and the fertile coffee-producing Galla country. Herr Hildebrandt returned to Aden (to find a great portion of the collections he had left there unfortunately destroyed) and then crossed over to the Somali coast. He luckily met with no ill-treatment at the hands of the natives, though these are of a savage disposition, and are conciliated with gifts to induce them not to murder the Europeans who are stranded at Cape Guardafui. The Somalis look upon these gifts as tribute, and systematically plunder the wrecks, which, through want of a lighthouse, are of frequent occurrence. Herr Hildebrandt finished his travels by visiting Zanzibar, and thence repaired to Europe, which he reached in September 1874, after two and a half years' journeying.

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FRENCH GEOGRAPHICAL SOCIETY.

Bulletin for August.

THE first article consists of a portion of the journal as well as extracts from letters of the late M. N. D. Dupère, who recently lost his life while exploring to the south-west of the Gulf of Tripoli. M. Duveyrier, who contributes the paper, remarks that the French in their endeavours to lay open this part of Africa, are exposed to much the same dangers which the English encountered and still encounter on the frontiers of Hindostan, where fanaticism and hatred make every step beyond the boundary-line one of peril. The next paper is one by M. J. Thoulet, on the gnomonic method of projection, illustrated by diagrams and formulæ. An interesting communication from the Abbé Armand David follows, in which the worthy father explains his object in recently visiting China, which was to penetrate into that perfect *terra incognita* Tibet, from the side of Mongolia and Koko-Nor. In this hope he was disappointed, as the Chinese officials refused to grant him passports, on the ground of the Muhammadan rebellion in those parts. Had Père David been a layman, he would probably have encountered little opposition, for Prshevsky who succeeded in getting further than Koko-Nor found the Muhammadan rebels the most pitiful set of cowards imaginable. Père David started from Peking in October 1872, passed through Si-ngan-fu, and tarried five months in the Tsing-ling mountains, a little known range of about the same extent as the Pyrennees, and crowned with several peaks averaging 12,000 feet in height. In its mountains David found a curious intermixture of the flora and fauna of Northern and Southern China. He then ascended the Hankiang to Hanko (in one of the rapids of which he was upset, and contrived to lose part of his collections and baggage), and in the summer and unhealthiest time of the year, commenced to explore to the west of Fokien. Violent fever and bronchitis then overtook him, and it was with the greatest possible difficulty that he managed to reach Shang-hai in March 1874. The Abbé, in conclusion, details his views on the population of China, (*vide* our August number, p. 213). We are glad to learn, from a footnote to this article, that the Society intend shortly to publish a *résumé* of the numerous

voyages made by M. David in China. Then follows a short account of M. De Puydt's researches in the isthmus of Darien, with a view to determine the question of the practicability of a ship canal, and the number closes with a review of M. Lenant de Bellefond's history of public works in Egypt from the earliest times.

Bulletin for September.

THE first article in this number is a *résumé* of the Marquis de Compiègne and M. Marche's journey along the course of the Ogowai River in Central Africa. This journey the marquis says was brought to an untimely end, just as they were anticipating success, owing to a combination of unfortunate circumstances, among which may be mentioned the death of a friendly chief, N'Combe, and the hostility of his subjects, the extraordinary lowness of the streams, wars between native tribes, and the ill health of the explorers. They started in the early part of January 1874, and at about 200 miles from the mouth of the Ogowai, came upon a tributary called Obanga, which is said to flow from the neighbourhood of the Gabun River, a fact of importance, as the mouth of the Ogowai is often obstructed, and communication might thus be possible by this other channel. The course of the Ogowai, as they proceeded, proved to be studded with rocks and islets, and numerous miserable villages were visible on the banks. At Okota they turned aside to visit the king of the country, and after a stormy discussion were forbidden by his Majesty to proceed further. A judicious use of threats, however, proved effectual, and the party was allowed to proceed. Rapids were continually met with, and the river here appeared to burst through a mountain range. After six days' travelling the rapids ceased, and the stream widened to about a mile in breadth, but sandbanks and rocks were not unfrequent. Two days' later, on the 27th of January, they reached a village called Lope, beyond which no whites had ever penetrated. Here, the obstinacy of the carriers detained them a whole month, and the time was spent in exploring the Okanda country, which extends for about 45 miles along the left bank of the Ogowai. The Okandas treat traders well, but are excessively lazy: their chief occupation is to buy slaves, whom they resell to the coast tribes. Eventually, on the 28th of February, 120 natives agreed to escort the travellers as far as the Osyobo country. On the 3rd of March they passed a large tributary called Ofue, which is the line of demarcation between the Okanda and Osyobo countries, and which leads to the land of the Shibe tribes, a race of remarkably fine men. The banks were here well wooded and formed a shelter for the Osyobo tribes, who often came down to the river's edge with an outward appearance of friendship, which, however, the exploring party did not venture to place trust in. On the 10th of March, at about six o'clock in the morning, they were assailed with firing from the bank, six men were badly wounded, and the chief boat was upset. After attending to the wants of the wounded, they resumed their journey, and soon reached the Ivindo River, a stream as large as the Ogowai, with some dangerous falls and rapids, and extensive lakes distant about four or five days' journey. Here, again, another attack was made upon the party by the Osyebos, and the canoe men, in great terror, beat a hurried retreat, in spite of the most urgent remonstrances of the French travellers. This unfortunate affair caused the collapse of the expedition, which, nevertheless, has proved that a properly-equipped party may penetrate by this route to a considerable distance into the heart of Equatorial Africa.

The above article is the most important in the September *bulletin*. The remaining ones claiming notice are an explanatory memorandum on a new system of geography, based on the usage of decimal notation, gnomonic projection and other conditions, two articles on the decrease of the indigenous races throughout the globe, and an obituary notice of Livingstone.

Bulletin for October.

M. DELESSE has contributed to this number a map of France designed to illustrate the agricultural productivity of the country. It is based on statistics collected in 1852, pursuant to a decree of the National Assembly. These have been embodied cartographically on a map of the scale of 1:500,000, on which the produce of each *canton* was shown, and from this map M. Delesse has compiled the smaller map (scale 1:4,000,000) now before us. Of course there is no attempt to go into detail; the idea is simply to convey at a rough glance the proportion of revenue derived from arable land, vineyards, pasture and woods; different shades, varying from light to dark, serving to indicate the poorer or richer land, woods being coloured green, arable land brown, and so on. Viewed as one means of illustrating the resources of a country, this map is most valuable; in a great agricultural country like India, for instance, such an aid to our statesmen, could the statistics be readily and accurately got together, would prove of the greatest service. In the map now before us the antiquity of the data is certainly a drawback, but M. Delesse considers that the *proportion* holds true at the present time.

Other articles of note are a review by M. Harris, of the doubts cast by the author of a recent article in the *Bulletin*, on the authenticity of the *Life of Christopher Columbus*, purporting to have been written by his son; a review of M. Paul Gaffarel's work on the circumnavigation of Africa, as narrated by the Greek Eudoxus of Cyzicus, and two communications made to the Society, one on the subject of the sulphur mines of Louisiana, U.S., and the other from M. Gorelix, on his travels in the province of Rio Grande del Sud, in South America.

Bulletin for November.

THIS number opens with a notice of M. Dupuis's exploration of the Hong-kiang or Red River of Tong-kin.* He observes that for a vessel to reach Hanoi the chief port at all seasons, it is necessary that it should not draw more than 5 feet 10 inches. There are four mouths to the Hong-kiang, and until these are properly surveyed it will be exceedingly difficult to approach Hanoi. Beyond Hanoi, boats drawing as much as 6 feet 9 inches to 6 feet 10 inches can ascend as high as Yunan, but powerful engines are indispensable owing to the strength of the current. Hanoi is about 110 miles, and Yunan about 340 miles from the sea. This way of communication is a most promising one, and will prove of importance for purposes of trade, all the goods imported up the Yang-tse-kiang being equally adapted for the requirements of Yunnan, while among exports tin, copper, iron, and lead would play an important part, as well as tea, opium, and colouring and dyeing materials. M. Dupuis's idea is that in a few years the trade of the Red River ought to attain at least half the magnitude of that of the Yang-tse, as it would open up communication with the south-west provinces of China, with Laos and Tibet, the populations of which countries amount to an aggregate of about 50,000,000.

M. Dupuis contributes valuable topographical information regarding the chief towns of Tong-kin, and gives a detailed description of Hanoi, and its citadel, as well as an account of the siege of the town in November, 1873.

A translation of Captain Kostenko's paper on Khiva in 1873 finds place, as well as an interesting account of the three attempts which have been made by the Americans to obtain satisfactory soundings for laying a telegraph cable along a line from Yokohama to San Francisco. The soundings prove that the only chance of success is to keep close in to the Aleutian Islands,

* This river bears other names such as Hoti-kiang, Songka, or Song-kui, but M. Dupuis considers that the proper name is the Red River, a term derived from the reddish colour of its waters during the rains, which is occasioned by red mineral deposits in its upper course.

and even along this line further investigation is required before any definite conclusion can be formed. These soundings, however, have proved the existence of a cold counter current at a depth of 110 feet below the surface of the warm Japan current. A review of a French work on the United States of America concludes the number.

Bulletin for December, 1874.

M. DUVEYRIER contributes to this number a notice of European travellers and men of science who have died in Africa, illustrated by a map of the continent in which each place signalled by a death is marked with a cross, and a reference shows the name, nationality and date of the event. He states that ignorance of the climate and of the physical geography of the country has mainly contributed to excessive mortality in different expeditions, and points out that in Tuckey, Mungo Park, and Laird and Olfield's, the proportion of Europeans and natives that succumbed to fever and other ailments was positively enormous. The religious fanaticism of the Muhammadans has also helped to kill many. M. Duveyrier does not omit to point out that, although the use of quinine dates as far back as the 17th century, it was not till comparatively recently that the proper use of sulphate of quinine was understood, as Lander's medical instructions, on the occasion of his setting out for the Niger, were to use it only as a strengthening medicine *after* attacks of fever. M. Duveyrier's article will be found an exhaustive one, reaching down to last year. A perusal of it shows most strikingly how terribly costly has already proved the laying open to civilization of this huge and still so little known continent.

A description of the new hydrographical or catchment basin map of the department of Seine-et-Marne follows, as well as an explanatory memorandum detailing a new method of constructing relief maps by Mlle. Kleinhaus, instructrix of geography in one of the French normal schools.

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THE
GEOGRAPHICAL MAGAZINE.

APRIL, 1875.

TRADE ROUTES TO WESTERN CHINA.

ON the 5th of this month the present writer sent the editor of this magazine some very interesting notes which he had received in a letter from Mr. Ney Elias, writing from Bamó full of hope and high spirits, just before starting (9th of January) to meet his friend Margary. The next day I heard, with grief indeed, of the disaster which had befallen the party. With Colonel Browne and Dr. Anderson, Elias is, I trust, unhurt; but the friend whom he had rejoiced to meet under such singular circumstances—the young Englishman who had just successfully accomplished the feat of travelling from the China Sea to the Irawadi, a feat which had hitherto baffled so many gallant attempts—has been treacherously murdered. There is hardly anything sadder in the history of travel. Margary is not indeed, like Hayward, a martyr to geographical enterprise, but (better than that) a martyr to his duty as an English public servant. And it is a pity that the Minister who had to answer about him in the House of Commons showed that he had not the slightest conception who this sufferer might be! Mr. Grant Duff sometimes vexed our Anglo-Indian souls with what seemed to us untimely optimisms; but sympathy as much as knowledge would have secured him, and would have secured Mr. Bourke also, against such stumbling.

I see that General Margary in a letter to the *Times* (March the 9th) quotes a telegram in which "the nephew of Lee-See-Hie" is named as the leader of the band that committed the crime. This man *Li-si-tai* or *tai-hi* is often mentioned in the reports of Major Sladen and Dr. Anderson. The former calls him a dacoit or freebooter; but, in fact, he seems, from what Anderson says, to have been a leader of the Chinese Imperial party, who held his ground resolutely against the Muhammadans, and struck at them, and at all whom he supposed to be their friends, from his fastnesses midway between Momien and the Irawadi. The jealous Chinese traders at Bamó stirred him to oppose the advance of Major Sladen's party, and he was believed to be the author of the attack made upon that party just before they reached Momien. Now that the *Panthés* (Muhammadans) have been crushed, one can understand that this personage may be somewhat rampant, and may have gladly seized the opportunity to wreak his vengeance for former failure on the new English mission. But this can hardly be more than one element in the tragedy, and if royalty has been cognisant, one may hope that royalty may yet

learn the lesson for which the elder Boswell commended Cromwell, to the infinite disgust of his guest Dr. Johnson.

I write these notes, at the editor's request, to accompany a map which I shall not see till it is published. I must assume that it will contain all that is needful, as shown in the map before me, which is Colonel Thuillier's of 1870—"Eastern Bengal, Burmah, and parts of China and Siam, on a scale of 32 miles to the inch."

The chief races occupying the region should be briefly noticed. The CHINESE have spread according to their manner, either by actual migration or by assimilation of previous occupants, over a considerable part of the lower lands between Yunnan and the Irawadi. The SHANS, the widely diffused race, of whom the Siamese are a great offshoot, always tolerably civilized and broken into a vast number of small principalities, subject to one or other of the neighbouring monarchies, are older occupants of those lower lands, as they were once of the better part of Yunnan itself, and of the Upper Irawadi Valley. The higher hills towards the Irawadi are chiefly occupied by tribes of half civilized KAKHYENS or KACHYENS, the same race that on our Assam frontier call themselves, and are called, *Singphos*, i.e. in their tongue "Men." BURMESE appear to be few in number even on the Irawadi, so high up as Bamó. There are many tribes besides those we have named, but an attempt to detail them would be inappropriate to our present object.

TALI-FU is a central point, on which nearly all the routes of which we have to speak converge; and for ages it has been the base of all operations, military or commercial, from the side of China towards Burma. It may still be regarded as the western capital of Yunnan, as it was in the days of Marco Polo, who gives it the Mongol name of that province, *Carajang*. For many centuries before Kublai conquered it (A.D. 1253), Tali-fu had been the seat of a considerable Shan kingdom, called by the Chinese *Nan* (or Southern)—*Chao*; this latter term being a Shan word for prince, which still figures among the titles of the kings of Siam and all the other states of that wide-spread race. During the recent brief independence of the Muhammadans in Western Yunnan (probably themselves as much Shan as Chinese in blood) Tali again became a seat of royalty, and here reigned Sultan Suleiman from about 1860 to 1873, when the city was captured by the Imperialists and the Muhammadans were massacred. The Sultan himself took poison, but his head was sent in honey to Peking. Tali overlooks a fine lake and

an extensive treeless plain. Lofty mountains rise behind the city, covered with snow for nine months out of the twelve. The lake, which stands at 6957 feet above the sea level, is 24 miles in length by 6 in width: it discharges by a short stream into the Mekong, and the local story goes, no doubt fabulous, that boats have come up to Tali from the ocean.

From Tali towards the Burmese capital one chief road runs direct; the rest make westward for the nearest points of the Irawadi, at and about Bamó.

The direct road is that by THIEN-NI (in Shan, *Muang Tseni*), formerly the seat of a considerable Shan principality. This road has never been traversed, nor has Thien-ni been reached, by any European. In the spring of 1865 Captain C. E. Watson, and Mr. Fedden, of the Geological Survey, were within about one march of it, but the place was then in the hands of an insurgent chief, and they were obliged to turn back. Mr. Fedden's map places Thien-ni in about $23^{\circ} 17'$, a good deal further north than it is in my map of 1855, but no doubt much nearer the truth. The road from Thien-ni runs to the secluded Shan principality of Kaingma, and thence to the Chinese city of Shunning-fu, called by the Burmese Shwen-li, and by the Shans Muang-chan.* About Muang-Ting, on the road between Thien-ni and Shunning-fu, is a very unhealthy tract which the traders push through as rapidly as possible. The road then crosses the great Mekong by an iron suspension bridge, and thence runs on to Tali. The whole distance from Mandalé to Tali by this road is about 35 marches. It was by this Thien-ni route (so it is stated in the *Geographical Magazine* for January last, p. 22, and I believe, correctly) that Colonel Browne's party was originally intended to proceed, and deeply it is to be regretted that the intention was thwarted, as it was, by the Burmese King. The insurgent movements upon that line afforded him a pretext to allege, justly or unjustly.

BAMO, in latitude $24^{\circ} 16'$, stands on a high bank over the Irawadi, on its eastern side, about 2 miles below the entrance of a considerable stream called the Tapeng River.† It is a small stockaded town of unburnt brick, chiefly populated by Shans, but with some fifty or sixty houses of Chinese. Here, or hereabouts, has long been the water terminus of the land commerce from China, and as early as the famous world-map of Fra Mauro at Venice, terminated in 1459, we find a rubric on the Upper Irawadi (though that name is unknown to him) which runs:—*Qui le marchavantie se translata da fiume a fiume per andar in Chataio*; "Here goods are transferred from river to river to go on to Cathay." And in the first half of the 17th century there is some evidence of the maintenance here of an English factor by the East India Company. The staple of the imports from China has always been the silk of Szechwan, in return

for which cotton is carried back from Burma, but many minor articles swell the aggregate of trade.

At or near Bamó, a variety of paths quit the alluvial valley of the Irawadi, here extending some 20 miles on the eastern bank, to traverse the broad belt of the Kakhyen Hills, which rise in the summits to 5000 feet and upwards, whilst the passes reach nearly to 3000. Thence the paths descend into cultivated and populous valleys, occupied by Shans and Chinese settlers, and drained either by the Tapeng and its branches, or by the tributaries of the Shwéli further south. The best known of these routes is that by which Major Sladen went to Momien. This route, at starting from Bamó, crosses the Tapeng by ferry, and keeps to the north of that river for the greater part of the way. It passes Ponlain in the Kakhyen Hills, Sanda in the valley of the Tapeng, Muang-la, and Nantin. At the latter place several other routes from the Irawadi fall in; one by the Hotha Valley, which, after quitting the Irawadi plain, keeps throughout to the south of the Tapeng, and another from Sawaddi,* a small town on the Irawadi, 8 miles below Bamó. This route passes through Muang-wan (Mowun of the Burmese, Longchuen of the Chinese), on a tributary of the Shwéli, and is said to be the easiest.

The first line is that most largely used by the Chinese traders at Bamó, and they have expended a good deal of money on improving it. The Sawaddi route is, however, also much used, and in January it was intended that our expedition should adopt that line. But as the attack upon it is reported to have taken place at or near Manwain (probably Muang-wain) in the Sanda Valley, it is evident that a change in the plans must have occurred, and that the expedition must eventually have taken Sladen's road. The chief stronghold of the hostile Chinese partisan leader, Li-si-tai-hi, already spoken of, was at Maphu, on this road, between Muangla and Nantin. From Nantin the road ascends rapidly by a series of stepped valleys to Momien, which is estimated by Dr. Anderson to stand at 5800 feet above the sea. The whole distance, as travelled by Sladen's party, was 120 miles from Bamó. On the way between Nantin and Momien a large extinct volcano (Ha-shuen-shan) is passed.

We have no account that I know of, except meagre native itineraries, of the road beyond Momien. Yungchang-fu is reached in four marches of about 60 miles in all. It is alleged that the difficulties of the road become much greater beyond Momien, and this seems probable from the very aspect of the map. For here the road has to pass athwart that formidable fascis of great rivers, descending from the highlands of Tibet, which give to the map of this region an aspect so unique in geography. Between Momien and Yungchang, the Shwéli and the Salwen (the great river which enters the sea at Martaban) are crossed, the former by a suspension bridge, the latter by boat.

Yungchang-fu, the Wuncheng of the Burmese and Yongsang of the Shans, is the chief mart of Western Yunnan. It was the *Vochan* or *Unchan* of Marco Polo, and was in his time the seat of the Mongol garrison which occupied the country of the half civi-

* This triple nomenclature applies to all places on this frontier, or nearly so.

† This river is notable in the history of geography. For before any modern European had seen it, Klaproth, in working out his theory of the identity of the Sanpu of Tibet with the Irawadi, had convinced himself and half the geographers of France and Germany that this Tapeng was the real channel that brought in the Sanpu. But when the river was once seen—first, I think, by Colonel Hannay, the theory would literally no longer "hold water."

* This is no doubt the Indian classical name Srāvasthī, or (in Pali form) *Savatthi*, belonging to one of the cities most famous in Buddhist legend, and the ruins of which, on the banks of the Rapti, in Northern Oudh, have been identified and explored by General Cunningham.

lized tribe whom he calls by the Persian name of *Zar-dandán*, or "Gold-teeth"; a tribe whose identity it has not yet been possible to ascertain satisfactorily. A road from Yungchang joins the Thein-ni route at Shunning-fu.

Tali-fu is distant from Yungchang about 112 miles by the Burmese itineraries, occupying six to eight marches. Marco Polo makes it five only, but, considering the nature of the country, they must have been very stiff ones. In this interval the great Mekong, and two other considerable rivers, are crossed by iron suspension bridges.

There is a route to Yungchang from the Irawadi by the Shwéli Valley, but I can find no information regarding it. Though the river is not navigable for any great distance, it is a large one, and, flowing as it does through a broad valley, one would expect it to afford facilities to a road. Yet we do not hear of it as one of the frequented trade-routes.

From Tali to the provincial capital Yunnan-fu is reckoned at twelve stages, and the Burmese itineraries make the distance about 200 miles. Yunnan-fu has been visited and described by Garnier. It suffered much in the Muhammadan insurrection, when its populous suburbs were entirely destroyed, though the *Panthés* never succeeded in capturing the city itself. It is, however, the natural centre and mart of a country abounding especially in mineral wealth, and has probably ere now regained much of its former population and prosperity. It stands at a height of 6400 feet above the sea, on the shores of a great lake, not less than 70 or 80 miles in circumference.

Mr. Margary appears to have reached Yunnan-fu by a route through Kwei-chan, of which an account would have been most valuable, but it is scarcely to be supposed that his journals have been saved.

Whatever may be the destiny of the route of issue from Yunnan by the Tongking waters, of which the French have formed, with reason, so great expectations, at present the most important route from Yunnan-fu is that to Siuchau, the head of the Yangtsé navigation. It is reckoned to form twenty-four stages.

Formerly there existed a very important trade-line from Yunnan to Canton, which involved little more than twenty days of land travelling; taking up the navigation of the southern or Nanning-fu branch of the Si-kiang or West River of Canton. The navigation commences at *Pé-sé-p'u*, a place that I cannot indicate on the map, but which appears from Biot to be in the Ssengen-fu department of Kwangsi. The voyage thence to Canton is of twenty days, down stream. The road of late years, owing to the disorders in Kwangsi, has been entirely abandoned; but "the metals of Yunnan, the jade and gems of Burma, the musk of Tatsienlu, and many other articles of that remarkable through-trade which passed through Yunnan from west to east, went formerly by that route."*

Returning to Tali, we find another important trade-route running, as straight as may be in such a country, from this to Chingtu-fu the capital of the vast and wealthy province of Szechwan. It passes through the city of Ning-yuan-fu, in a region as yet utterly impenetrable to foreign travellers, at the head of the charming valley of Kienchang, which is undoubtedly, as Baron Richthofen has lately shown, the long-sought *Caindu*

of Marco Polo. This road falls into the Tibetan official road from Chingtu to Bathang and L'hasa at the eighth stage from Chingtu. Richthofen attempted to travel this road, but after he had got successfully about half way to Ning-yuen, the outrageous aggression of a body of Chinese troops, and its consequences, compelled him not only to turn back but to abandon any renewal of the enterprise.

Another road from Tali leads north through Likiang-fu to Bathang on the Tibet road; indeed there are two lines, one on either side of the Kinsha-kiang.

The road by which Francis Garnier and his party reached Tali-fu in the beginning of 1868, is apparently not a trade-line of importance. They started from Tong-chuen in Northern Yunnan (latitude $26^{\circ} 25\frac{1}{2}'$), where Captain Doudart de Lagrée was left ill, crossed and recrossed the great elbow of the Kinsha, or upper course of the Yangtsé, and thence struck the upper end of the Tali Lake. As has been said before by the present writer, "a more daring enterprise of the kind has never been effected by any nation; though Colonel Pelly's ride to Riadth bears some resemblance to it."*

Let us now briefly recapitulate the travellers who in modern times have chiefly aided to augment our knowledge of the field we are treating of. I do not attempt to include the Roman Catholic missionaries: they have been numerous, but what they have contributed is not readily accessible; nor in good truth have they of late years effected much for geography in this field.†

I begin with Blakiston and Sarel, who were the first to reach the head of the Yangtsé navigation, ascending by boat from Hankau in 1861.

The French expedition just alluded to, after tracing the great Mekong upwards from the sea, entered on our field at Kiang Hung (or Xieng Hong) the capital of the Shan principality so-called, in latitude $22^{\circ} 0'$, which had been reached from Maulmain years before by Lieutenant, now General, William Macleod. The French passed up through Southern Yunnan to the city of that name, and thence to Tong-chuen, as we have just mentioned. There their gallant leader died, in the absence of Garnier and his detachment. On the return of the latter the party proceeded, bearing the body of their captain, to Siuchau, whence they descended the great Kiang.

T. T. Cooper, in 1868, made a gallant attempt to reach Tali and the Burmese frontier by taking the Tibet road from Chingtu-fu, *via* Bathang. But he was forced by the Chinese to return from Weisi, a town lying between the Kinsha and the Mekong, about 120 miles north of Tali. His subsequent vigorous attempt to penetrate to Tibet from Assam scarcely comes within our present subject.

Major Sladen, Dr. Anderson, and Lieutenant Bowers reached Momien, during the Muhammadan régime there, from Bamó in May 1868, and were the first to cross the Chinese frontier in that quarter. This expedition, owing to circumstances needless to touch further here, by no means added so much as might have been hoped for to accurate geographical knowledge.

Messrs. Watson and Fedden, as has been said, had

* *Ocean Highways*, 1874, p. 488.

† The work of Abbé David is not within our field. M. Desgodins has done something, but his friends at home have rather mishandled his data.

* Richthofen's Letters.

reached within some 20 miles of Thein-ni in 1865. Though travelling in a country previously unexplored, these gentlemen have managed to make their reports in the highest degree difficult to read, and do not convey very clear impressions of the nature of the country.*

Baron Richthofen's bold attempt to travel to Tali, and its defeat, we have just recorded. It is but a small item in the record of his vast services in the scientific exploration of China.

Finally, Mr. Augustus Margary has achieved a memorable place in the history of geography by his journey accomplished from the China Sea to the Irawadi, *viâ* Kweichau, Yunnan-fu, and Momien.

It would be scarcely reasonable to conclude this over-hasty sketch without a few words as to the commercial objects of exploration in this quarter. That even in such objects the reward will be considerable I doubt not, but I confess that I have never been able to enter into the very sanguine expectations that some hold and largely propagate upon this subject. Nor do I see much to modify in words that I used four years ago in addressing the Geographical Section of the British Association at Edinburgh on this question:—

"Many startling and inconsiderate statements appear in the memorials and other documents which have been addressed to Government on the subject of the new routes for trade with China, as, for example, when the agitators of the question talk of thereby opening up a new trade for our country with 200 millions of people occupying extensive and rich portions of the earth, as if, forsooth, the trade and products of a vast and varied portion of the earth's surface, merely because that portion happens to be described by one name, as CHINA, were like water in a lake, which may all possibly be drained dry, if but tapped at a single point in one of its narrow creeks. . .

"The probability of a great attraction of China trade to the ports of Pegu, even if there were a good highway opened out to the Chinese frontier, depends, not on rhetorical statements about the vast population and products of the Celestial Empire, but (and here I will borrow a felicitous expression, which I remember to have been applied in India, by that admirable public servant the present governor of Jamaica, Sir John Peter Grant) on the question where the *trade-shed* of that produce shall be found to exist—a question on which I have never seen any great light thrown. As regards the important part of the export

* Those who make such an unreasonable outcry against the Indian Government for attempting to establish a scientific and systematic orthography, had better study this pair of Reports (*Selections from Records of Government of India in Foreign Department*, No. xlix., 1865). It is only by a laborious and tedious collation of the reports of the two gentlemen named that one can even discover when they are speaking of the same places. Thus the *Laigyah* of Watson is the *Ledya* of Fedden; *Myik-ngai* of W. is *Myid-ngé* of F.; *Maing-Tseil* is *Mine-zaik*; *Maing-yau* is *Mine-yaw*, and so forth. It is necessary to draw prominent attention to these things: the amount of public money that has been wasted in India on un-edited or ill-edited publications is frightful to think of. The "*I have the honour to be's*" that have been printed and published would half outfit an exploring expedition. And what a figure do such confusions make in the eyes of foreigners! Captain Watson can only speak of Tali-fu as "the capital of the *Shan Turoks*." What jargon this is! and yet if rationally elucidated it might convey valuable information. For the words mean "Shan-Chinese." Does this mean that the Tali Muhammadans are of Shan blood?

trade at least, we have to look, not to Yunnan and Kweichau, which are in the main mountainous regions, but to Szechwan. I observe that Mr. Cooper, a sensible, and on this point quite unprejudiced observer, does consider that a large part of the produce of Szechwan would seek an outlet by the Irawadi, if the land-route were again open. Looking to the length of land-journey from the fertile portions of Szechwan to Bamó, this opinion certainly surprises me. . . . My own impression is that the Yangtsé, in spite of all the difficulties of its upper reaches, as being free from the complications of a double frontier, and the anarchy of tribes imperfectly controlled, will carry to the sea, for many years to come, the produce of Szechwan and Central Yunnan, rather than the outlet by Burma or the Shan States*.

"What I think we may reasonably hope for is this:—First to see Western China tranquilized, and the old channel of trade restored and stimulated, by the access of British steamers to Bamó; secondly from gradual but inevitable political change in our own relations to the Burmese Government, I should expect to see our own influence brought to act, either in the suppression of marauding, or in opening out by engineering the short road to the Chinese frontier cities, unhampered by such paltry obstacles as the intrigues of Burmese underlings, or the jealousies of Chinese traders; and I venture to think that our Government, as a general rule, need neither grudge the small cost of surveys and explorations beyond our frontier, nor *hesitate to apply some degree of pressure on native governments to sanction such measures, without which these governments are apt to think us not in earnest in our proposals.*"

These conclusions about the over-sanguine views of the promoters of the new routes were come to so reluctantly, that I was almost sorry to see the views which I had expressed in 1871 afterwards so strongly and unconsciously corroborated by a traveller so sagacious and so accomplished as Baron Ferdinand von Richthofen. Look at his paper, touching this subject, in *Ocean Highways* for January 1874.† I will extract but a few lines:—

"It is to be regretted that the expedition of Major Sladen, in 1868, which had to overcome so many difficulties and hardships, did not proceed further than Tang-yue-chau (Momien).‡ The real difficulties of the road commence east of that place. I have had to converse with several Chinese traders from Ning-yuen-fu who had been over it. They spoke in the most impressive terms, accompanied by emphatic gestures, of the long and steep up-hill and down-hill country which must be travelled over in crossing, first the two branches of the Lan-tsang-Kiang (or Mekong) and then the Lu-Kiang (or Salwen). . . . To render the existing roads . . . available for any kind of modern means of transportation would involve an enormous expense. The engineering difficulties even of constructing a railway, although of terrible magnitude, might perhaps not be insuperable. But to justify such a

* I here must omit remarks on what I cannot but still regard, as I have always regarded, as the preposterous project of a railway to Kiang-Hung or its vicinity from Pegu.

† Baron Richthofen had expressed like views more cursorily in his letters published at Shanghai in 1872.

‡ I believe this was, under all the circumstances, quite impracticable.

gigantic enterprise the prospective profits should be equally gigantic. This would perhaps be the case if a continent occupied the place of the China Seas, and the commerce of China had to take its outlet by way of Bamó. But under existing circumstances, the attempt to divert the trade of Szechwan to Bamó would be equal to the attempt to make the waters of the Yangtszé flow up stream.*

H. YULE.

A JOURNEY FROM SAMARKAND TO SHEHRI-SEBZ AND BOKHARA.

THE town and province of Shehri-Sebz, the "Green City" of olden time, and birthplace of the mighty conqueror, Timur-Leng, was five years ago known to the outer world only through an obscure veil of hearsay and fiction. But, in 1870, this veil was rudely rent by the same Russian bayonets who had hastened to protect the Amir of Bokhara against his unruly vassals, and what the princes of the ruling dynasty on the Zarafshan had for more than a century and a half been unable to achieve, was accomplished by a race from the far north, alien alike in tongue, in religion, and in ideas. The freaks of Fortune are curiously inconsistent, and most thoroughly is this feature exemplified herein, that the cradle of the former conqueror of Moscow, who had slain and led into captivity thousands of Muscovites, should, after a lapse of more than 500 years, be, by Muscovites, sought out, conquered, and opened up to the knowledge of the civilized world. It was not, however, in a retaliative spirit that the Russians acted, but in order to oblige an ally. The rebellious Jura Beg, who is at present kept in durance in Tashkend, had followed an example set by many of his predecessors, and acted upon by him on many previous occasions, and revolted against his liege lord. But the latter was now friend of the great "White Czar on the Neva," who does not suffer an ally to be wantonly assailed, and punishes those who resist his authority. The Russians, under General Abramof, came, saw, and conquered, but immediately withdrew after peace had been restored. Little was thus added to our knowledge of Shehri-Sebz, and it was not till last autumn that further information was acquired, when three Russians—M. N. Majef, editor of the *Turkistan Gazette*, M. Krivtsof, a photographer, and M. Bektchurin—made an excursion into the Shehri-Sebz Valley, which is a little under 13 German miles from Samarkand.

The province of Shehri-Sebz in Bokhara consists of three districts, Kitab, Yakobeg, and Shehri-Sebz or Kesh as it was formerly called. The latter communicates with Samarkand by means of two roads, one of which passing through the Cham gorge, is practicable for carts, and was used by the Russians on the occasion of their expedition in 1870, while the other, which is suitable for horses, ridden or led, and is half the length of the former, passes by Kara-Tepe through the Tachta-Karaje Pass, and emerges hard by the walls of Kitab. The first halting-place is Kara-Tepe, which during the Russian war against Bokhara was made the centre of the Amir's operations; it is surrounded by high mountains, and is situated a short distance from

Samarkand. After leaving the *rayon* of the last-named town and passing the Anchon-Arik Canal, cultivation gradually diminishes, and before the traveller's eyes there extends a wide steppe studded with brambles and thickets, bounded by an imposing panorama of mountains. Straight ahead may be seen the Hilan Sai Range, and the pass of the same name through which a narrow path leads to Karchi. To the left rise the dome-shaped summits of the Penjkent Range, and beyond them lies the mountainous region where the Zarafshan takes its rise, while behind the traveller the green-topped table-land of the gardens of Samarkand appears to merge into a boundless steppe. The road now takes a turn through a country strewn with rocks and boulders, and seamed with mountain torrents. By-and-bye, villages come in sight, and the land becomes cultivated, the medium, however, being only rain and not irrigation canals. The ground rises towards the Hilan Sai Range in terraces. The road winds round a spur of the mountain, and from the highest point of a small pass hard by one gains a fine panoramic view of the whole steppe country. From hence to Kara-Tepe it is about a league, but it is bad marching on account of the steepness of the road, and the numerous stones with which it is strewn.

After leaving Kara Tepe, the fortifications of which were destroyed by General Abramof in 1868, the traveller has before him the mountains of Kitab, which are traversed by a narrow pass called Kette-Sai, through which flows a small stream, while the road shifts backwards and forwards, first to one side of the stream and then to the other, but, nevertheless, is not difficult for horses. Not a vestige of life is to be seen, except in the few instances where, in the ravines, some grass has sprung up, and here one lights upon some solitary Kirghiz tents. The track becomes steeper, the stream grows fainter and disappears into the depths below, and the highest point of the Tachta-Karaje Pass is reached, an open spot about thirty paces in circumference, and just above grow some bright green lime trees of diminutive growth, from the boughs of which hang some primitive offerings, placed there by travellers, overjoyed at having overcome the difficulties of the road.

From the village of Kara-Tepe to the ascent of the pass is 3 leagues, while the distance from the top of the pass to the village of Kainar on the southern slopes is about 7500 paces. With few exceptions, the path is here wide enough for horses, and as one leaves the surrounding rocks, and approaches the gardens of Kainar, it widens out considerably, till a view is gained of the whole valley of Shehri-Sebz, and of the gardens dotted about the towns of Kitab and Shehir, which are girt with a common wall. In spite of the famed fertility of this district in the middle ages, the Russians could see nothing at the present day even equal to the fertility of Khiva. On three sides it is hemmed in by groups of mountains, and only on the western side, where the Kashka-Daria issues out, can the eye reach the distant horizon. The road passes first by a poor village, which even in the dry season abounds in miasmatic swamps, while in autumn and winter the whole plain is under water. It is divided from Kitab by a small plain, through which flows the Kashka River, a stream which, under the walls of Kitab, assumes the character of a mountain torrent. On crossing it one comes upon the wall encircling

* *Ocean Highways*, p. 406.

Kitab and Shehir, and the Russian travellers entered through the very breaches made by their countrymen in August 1870. A narrow street, half under water, leads to the citadel of Kitab, between which and other Central Asian towns there is not a pin to choose. It boasts a square, a bazar, narrow, dirty, and poverty-stricken; in fact, the only point of interest in Kitab was that the Russians happened to hear, amid the din of Tartar music, the words of command given in their own tongue — "Na Plecho!" (Shoulder arms); "Slushai! Na Karaul!" (Attention! Present arms!).

Similarly, in Afghanistan, one may hear "Right about face!" "Forward!" and other tokens of European influence. Ten years ago I was not slow to recognise in these words the first early symbols of western civilization, and now the traveller from the south will discern in the Russian words an unmistakable sign of the approach of that mighty power to the north. Who can say whether the close of another decade may not hear the words of command of both tongues mingling with the roar of cannon and the din of battle?

To return, however, to the description of the Shehri-Sebz Valley. The Russians fully confirm previous accounts of the extraordinary marshiness of this part of Central Asia. After a slight rain the streets of Kitab are a foot deep in mud, which the tropical heat of the sun cannot dry up. On the other side, the soil is irrigated by means of numerous canals and streams drawn from the Kashka Daria, and in point of fertility the valley is not surpassed by the famous district of Mijankal on the Zarafshan. Between Kitab and Shehri gardens, meadows, and cultivated plots of ground occur in unbroken succession, and fruit is especially plentiful. Indeed, were it not for the warlike spirit with which have been imbued all Central Asian races since the earliest times, the native land of Timur would probably be now more densely populated than it was even in his day.

Shehri, the second city of the valley, is rather larger than Kitab. A broad and commodious highway leads from the latter place to Shehri, which from being situated in a plain (in contrast to Kitab, which is on hilly ground), is rather cleaner than its sister city. It is famous for the ruins of some state buildings dating from the time of Timur, foremost among which must be mentioned the palace of Aksarai, on which the worthy knight Don Ruy Gonzales de Clavijo, ambassador of Henry III. of Castille to the court of Timur, tells us that the builders and artificers had been engaged for twenty years at the time of his visit (1405). The Spaniard speaks in terms of admiration of the broad and high entrance to the garden, which was beautifully adorned with glazed tiles, in blue and gold, as well as of the beautiful galleries and reception halls decorated with gold, azure, blue, silver and ivory.

The Russians found these ruins still very fine, and most interesting. To the south lies the dome which once crowned the building, and which can still be recognized, though it has fallen apart from the walls, which are covered with the remains of elaborate mosaics, inscriptions, and other decorations. Adjoining one of these walls is a poor building through which one enters into the citadel, which is larger than that of Kitab, and is garrisoned by Bokharian troops. Here the Russians accidentally met with the Amir Muzaffar Edin, whom I had met twelve years before. But he must be much altered, for instead of a spare

man with black hair, he seems to have changed into a gray-haired veteran inclined to corpulence, while his clear blue eyes appear to have lost some of their old fire. His glance, voice, and general appearance and manner recall, however, much of his pleasing address, though he has grown nervous and irritable, and stutters at the commencement of a sentence. To the Russians he was, as might be expected, very courteous, and hearing that there was a photographer among them, allowed himself to be taken in different postures, an act which formerly had to be practised in the strictest secrecy. Only the fortunate circumstance that Muhammad had not discovered the art of photography could have emboldened a prince of the true believers to take such a step. Twelve years ago, in Bokhara, the unhappy possessor of a portrait of a living human being suffered the extreme penalty of the law—and now a viceroy allows himself to be taken! *Tempora mutantur!*

The Russian travellers returned by way of Karchi and Bokhara, a route which, as far as concerns the portion between Shehri-Sebz and Karchi, deserves notice. We must mention first Yakobeg (detached gardens), a place which lies north of the Shehri-Sebz Valley, and formerly belonged to that district, but has since been incorporated into Bokhara proper. Through Yakobeg runs the road which connects Shehri-Sebz, with the northern khanate of Hissar, by way of the Kelte-Minar and Chatchak Passes. As far as regards the name Yakobeg, it is no longer in use, though Colonel Yule has not exactly erred in placing it on his map of the Upper Oxus. Kelte-Minar means dwarf tower, and on emerging from the pass one lights upon a ruined caravanserai, out of the *débris* of which may be seen protruding a low tower. From native accounts the route from Yakobeg to Hissar is made up as follows:—

Yakobeg to Yar-tepe . . .	3 tashes
„ Kelte-Minar . . .	7 „
„ Kara Kaval . . .	6 „
„ Chatchuk Pass . . .	6 „
„ Baissun . . .	10 „
„ Dinai . . .	9 „
„ Hissar . . .	9 „
Total . . .	50 tashes } or, 7 days' journey.

As far as my recollection goes, my informants told me the distance was much less.

On the road from Shehri-Sebz to Karchi may be seen to the south the clear outlines of the Hissar Mountains, four days' journey distant. The range dividing the basin of the Kashka-Daria, from that of the Zarafshan has now disappeared on the horizon to the north-east, while the Hissar Mountains gradually fade away to the south. One again emerges on to the steppe region, which is fertilized for some distance by the Kashka-Daria. But gradually culture diminishes, and the dwellings assume a poorer aspect till one approaches Karchi, where luxuriant cultivation again gains the upper hand. Karchi and Shehri-Sebz thus form the agricultural centres, and the former is also a place of some commercial importance. For a century and a half it has been the second city in the Khanate of Bokhara, and were it not for the constant broils of the Afghans and Uzbeks, which prevent any regular communication with India by way of the left bank of the Oxus, it would some time in the course of this century have outstripped Tashkend. A. VÁMBÉRY.

THE ITALIAN EXPLORERS OF NEW GUINEA.

ALTHOUGH so fully occupied with the preparations of your grand Arctic Expedition, which appears to have thrown into the shade even the mighty doings of the 'Challenger,' I venture to hope that the following items of news of the doings of our travellers, Beccari and D'Albertis, both of whom are now in all probability exploring, in opposite directions, the vast and little known land of the Papuans, will be of some interest.

To begin with Beccari, I will remind you that when I last wrote (vide *Geographical Magazine* for 1874, p. 236), he was at Kandari, exploring a nearly untrampled corner of Celebes; since then he has left that island, but not before meeting with other unpleasant adventures, which happily enough ended well; the following letter of his, which I translate, will tell the tale:—

“MAKASSAR, 30th August 1874.

“Several days since I returned from the excursion of which I spoke to you in my last, but it was of no advantage to my collections. On the 15th of May I left Kandari in my boat, with six men and provisions for a month. Favoured with a land breeze, we were soon out of the inner harbour, which, from the outside, has all the appearance of a river. The land breeze at Kandari is often very strong, and is to be felt at a considerable distance from the shore. Nearly every morning a thick mist rolls down the bay, and slowly vanishes towards nine or ten o'clock. I believe that the fact that the mangroves, and other trees, which skirt the shore, are covered with long *Usneae*, very unusual in these countries, except on the mountain tops, may be fairly explained by the occurrence of that daily fog.

“As we proceeded, the land-breeze fell, and, after an hour's lull, the wind blew from the sea, and, carried by it, we entered the bay of Mar-Amu, anchoring behind a small island named Wawosodu. The rajah of the *Tokkias* had lent me one of his men, well acquainted with this locality, and known to its inhabitants, who are also *Tokkias*; thus I had nothing to fear from them. In those days a large party of head-hunters were said to have come down from Kanawi; I was therefore told to be watchful. They are not, however, so very formidable, and it suffices not to be alone or unarmed, for they do not dare to attack anyone capable of the slightest defence. As far as I am personally concerned, I am convinced, on account of the impression I have made on the first of those savages who saw me, that my beard is sufficient to frighten them off. Probably, none of those *Tokkia* have as yet seen a white man, and much less a long-bearded one. But the case stands very differently with the pirates, who may surprise us at any moment: with them the presence of an *Orang putih* (white man) is always associated with that of rich booty. On account of the pirates the coast is wholly without inhabitants, and I should therefore be obliged to live in my boat; an excursion up one hill soon convinced me that there was indeed little to collect. I therefore recrossed the outer bay of Kandari on the morning of the 17th, and anchored near the small island of Bokori, off Cape Ripa-Ripa. I had been told that that strange megapode, the *Malleo* or *Megacephalon malleo*, was common to that island; but it is likely that the natives mistake true *Megapodii* for the *Malleo*. There being no primeval forest I did not stop at that place, but turned Cape Ripa-Ripa, with the intention of going to Lembò, near the island of Iabenki. The land wind had fallen, so that we were obliged to use our oars, but not being able to overcome the strong current of the Sampara River, we cast anchor at Sabapulo, a small harbour. Up to the 24th I vainly tried to cross the mouth of the Sampara: the wind was always dead against me, and I could not get northwards. That day I was joined by five Bughis *prahus*, coming from Kandari, from whom I learnt that the pirates were at Lembò, where they had killed some of the Kandari people. The five *prahus* were all armed with swivel-guns or *lelas*, and were on their way to apprise their friends of the approach of the pirates. Of course I had to give up all idea of proceeding to Lembò, and commenced my retreat on Kandari. The next day (25th) I returned to Sabapulo, and there I landed with three men in the small boat, leaving the other three to take care of the *prahu*. I ascended a hill with the intention of seeking the huts of the Alfuros, in order to obtain, if possible, fresh provisions. I was crossing a paddy-field, and

had not yet reached the huts of the Alfuros, when gun-shots were heard from the direction in which my boat lay, but more to the westward: there could be no doubt about it, the Kandari *prahus* had fallen in with the pirates. After a while the firing ceased; one of the parties had given in, perhaps the pirates were advancing. I had no time to lose; I rushed headlong down the hill in hopes to save my men and my boat; those who were with me could hardly keep up with me on account of their bare feet. After losing some time in disengaging the small boat, which was high and dry amongst the mangroves, we at last reached my *prahu*. I at once ordered two of my men to proceed in the small boat to the mouth of the inlet in which we lay, to try and find out what was going on outside, while I and the rest prepared and loaded our weapons—these consisted in an Albini rifle, a double-barrelled, breech-loading, large bore rifle, loaded with explosive bullets (excellent for sinking the light piratical boats), and a couple of revolvers; my men were each armed with a double-barrelled fowling-piece, a spear, parang, and kris. The small boat soon returned with the news that seven small piratical boats were in sight, making for where we lay; my men had hardly got on board when they were in sight, rounding the headland on our right. Seven piratical *prahus* could not contain less than seventy men, ten times our number! We lay 200 metres from the shore, there was ample time for a retreat that way, but I preferred to try my chance otherwise. '*Audaces fortuna juvat*' has ever been my favourite motto, and even this time I had not cause to repent having followed its impulse; but at that moment my thoughts flew to you. Only the thought of falling alive into the hands of such a cruel and brutal set might have made me pause an instant. I next ordered the anchor to be heaved, and the prow to be turned towards the enemy. My only chance was to meet them separately; to have attempted to outrun them would have been folly. Five of the hostile *prahus* had meanwhile approached, and I was about to open fire at 1000 metres, in hopes to intimidate them with the long range of our arms, when my men informed me that the approaching *prahu* appeared to belong to Kandari. They were, in fact, those we had met the preceding day, and on getting nearer we recognised the people on board. All apprehension had ceased. We got alongside to hear the news: it was they who had attacked the three piratical *prahus*, two of which were those seen by my men in the boat; the Bughis had not pursued them, because ten other piratical *prahus* were in sight. There was, therefore, no time to lose. We turned back. At Bokori, behind Cape Ripa-Ripa, we fell in with a fleet of Kandari *prahus*, with the rajah on board: having heard the firing they had put out to our assistance. Next day we arrived at Kandari; the whole place was topsyturvy, for the pirates were expected in the night, and it was supposed that they would have landed on the opposite side of the peninsula, and, crossing the hills which separate Sabapulo from Kandari, taken the village in the rear and burnt it. Most of the people had carried their goods to the boats; I, instead, had mine carried from the boats to the house, for I did not credit the rumours which were afloat.

“On the 27th, however, the pirates did approach Kandari, and arrived at the small island of Bokori; several of the Bughis *prahus* went out to meet them, but finding them too numerous did not dare to attack them, and sent back for reinforcements. The next morning I went out with ten *prahus*, all armed with small brass cannon (*lelas*). We got in sight of the enemy, but as soon as the pirates perceived our number, they retired towards Saponda-laut, and we could not pursue on account of the strong contrary wind which had meanwhile arisen, for the rowers were not enough. We therefore returned to Kandari.

“After what had happened I could no longer think of venturing alone in my boat out at sea; I therefore went to Lepo Lepo. The months of May and June had been so rainy that very little had been done for the collections. At Lepo Lepo I now turned my whole attention to plants, and I employed the latter half of June and the whole of July in describing from live specimens. During these botanical researches I ascertained more and more the slight individuality of the Celeban flora. I do not think that I have found a single new genus; nearly all the species collected may be referred to Bornean and Molluccan forms, and, if different, they are always nearly allied. Some Indian plants, which do not figure in the Javanese flora, reappear in Celebes. As over large tracts in that island the forests have been destroyed, there is a predominance of those plants which I do not consider indigenous, but of recent immigration; thus, for example, the *Compositae*, the *Convolvulaceae*, the *Labiatae*, the herbaceous *Leguminosae*, the *Cyperaceae*, the *Graminae*, &c. However, I have explored but a small portion of Celebes, and it may be that other parts are richer in endemic plants.

"Meanwhile, as several Bughis *prahus* had agreed to sail in convoy to Makassar, I was able to send news concerning our blockade by pirates. The evening of the 7th of August, as I was returning from botanising, messengers arrived from Kandari with the news that a Dutch steamer had arrived enquiring for me. The same night I started, and next morning I was on board the Dutch war steamer 'Sumatra.' Lieutenant-Commander Holtzapfel was most kind: he had brought my letters, papers, and provisions. He offered at once to give me a passage to Makassar, and on my telling him that I should require a few days to pack up my collections, he most kindly consented to wait. On the arrival of my letter telling about the pirates, there were no men-of-war at Makassar, but as soon as the 'Sumatra' came in she was at once despatched by Governor Bakkers to Kandari. I have, therefore, every reason to be extremely grateful to the Dutch Government. On the 10th we left Kandari; we vainly tried to hear something about the pirates in the Muna Channel; on the 13th, after some hydrographic and surveying work, we touched at Bonthain, South-west Celebes. Bonthain Peak must be about 2000 metres in height, and I suspect that it is a volcano; the doubt came on seeing pebbles of lava in the village, and in remarking that the fertile valley around presents a black mould so characteristic of decomposed lava. Up to now I believe true volcanoes have only been found in Minahassa, North Celebes; it would be therefore of great geological interest to investigate the true nature of Bonthain Peak. On it, at about 1000 metres above the sea, is a small sanctuary. On the 14th we reached Makassar."

The letter I have translated is addressed to Marquis Doria; in another, bearing the same date and addressed to Count Salvadori, Beccari gives some interesting ornithological news. The woodpecker, a rare bird in Celebes (we are on the frontier of the woodpeckerless Australian region), is considered sacred by the Bughis; the merchants keep the dried skins in their coffers, under the belief that they will bring money thereto. The hornbill is also venerated, and its head is hung up in shops for the purpose of attracting buyers. From Makassar, Beccari proceeded to Surabaya, and thence to Batavia and Buitenzorg; at the latter place he spent some time in the magnificent Botanic Garden, studying the rich collection of plants in that herbarium. On arriving at Makassar, he had received the funds so generously placed at his disposal for a second journey to New Guinea, by the mayor and provincial council of Genoa, and at once began his preparations for the voyage. He left Batavia for Ternate on the 18th of October, it being his plan to procure a boat there and sail thence for Geelvink Bay. On the 12th of November he wrote from that place, where he had been very cordially received by the Dutch Resident Van Mussembroek. We all thought Beccari already on his way to North Papuasia, when a letter came from Amboina, dated December the 7th, in which Beccari told us that he had not succeeded in getting a boat at Ternate, and had therefore gone to Amboina, and there had nearly settled to hire the 'Burung Laut,' the schooner in which he went the first time to Sorong.

The last mail brought in other letters of our friend, dated up to the 9th of January; he has been most successful in his natural history collections, not only at Ternate, but in the neighbouring islands, where he sent hunters; nine big cases are on their way here, and they contain, besides other collections, about a thousand bird skins, a very complete series of Amboina fishes, and that zoological rarity, an entire specimen, in alcohol, of the pearly nautilus. He received a most valuable donation of rare Papuan and Malayan bird skins from Mr. Bruijn, an officer in the Dutch Navy. At Amboina, on the 9th of December, *en amateur*, he took four good sights at the transit of Venus; the planet appeared like a crown

piece on a white surface; the exit was most distinct. He has succeeded in hiring the schooner 'Deli,' the former one not having kept her appointment. He was to leave on or about the 20th of January, and thus he has, in all probability, reached New Guinea long ere this. Beccari proposes exploring the north-west extremity of New Guinea. He will first visit the islands of Geelvink Bay, return to the Arfak Mountains, and thence push eastwards as far as the Ambernoh River, which he intends to try to ascend, in order to reach the high mountains which overlook Utanata. If circumstances admit he will also try to reach Humboldt Bay. Mysol, Battanta, Waigin, and Salwatti will be probably visited on going or on the return voyage. Beccari is well provided with instruments, provisions, &c.; he has with him seven Amboinese hunters and bird-stuffers, most of whom have had ample collecting experience with Wallace, Rosemberg, Bernstein, and Meyer. He writes to me that he intends also giving special attention to ethnology, and we may confidently expect very interesting results from this, his second expedition to Papuasia. He believes that he will be back at Ternate towards the end of October.

I cannot close this letter without giving you the last news received from D'Albertis, who, as you probably are aware, left Naples on the 10th of November last, together with a Signor Tommasinelli of Genoa; they both intend exploring the southern coast and eastern extremity of New Guinea; and, before leaving, D'Albertis told me that his plan was to lay his headquarters at Somerset, Cape York, and thence to take the earliest opportunity for reaching New Guinea; he appeared to rely somewhat on missionary boats, which now frequent that coast. In a letter written from Batavia at the end of December, he tells us, however, that he had purchased a boat at Singapore, but had not succeeded in getting any men. The boat was to follow him to Java, where he had been unexpectedly detained on account of the non-arrival of cases he expected from London; he feared that that delay would oblige him to stop a month at Somerset. At Singapore, on his way out, or rather at Johore, D'Albertis had fallen in with Miklucho Maklay, the distinguished Russian naturalist and traveller; he was preparing to journey right through the Malayan peninsula, in hopes of being able to investigate the true nature and affinities of the *Simangs*, which he believes to be of Papuan origin. In fact he, Meyer, and Beccari, advocate the unity of the Papuans and the Asiatic Negritoes, in which, up to the present, I am loth to believe.

HENRY HILLYER GIGLIOLI.

SOME WORDS ABOUT NEW DANGERS AT SEA AND ERRORS IN CHARTS.

No subject can well be of deeper interest to all connected with navigation than the discovery of new dangers at sea, especially if far from land; and it is therefore surprising with what recklessness, and on what insufficient grounds reports of such discoveries are sometimes made. Even when there is no doubt as to the fact, the data supplied to determine the geographical position are too often most vague and unsatisfactory.

The worst evil of such illusory or insufficient reports is, that when once a doubtful danger gets a place on our charts, it is extremely difficult to disprove its existence in a satisfactory manner, and even then there always remains an unpleasant doubt whether it may not, in fact, exist, although not in the assigned position. Our charts have at present far too many of such "vigias," or doubtful dangers, scattered over the ocean, none of which a ship approaches with any feeling of security, although it is pretty certain in the majority of cases the supposed danger has no real existence. Indeed the vicinity of one of these in bad weather can hardly fail to add considerably to the anxiety of the navigator.

The subject of the discovery of dangers is treated of in Raper's valuable work on navigation, pp. 359-364, where brief directions are given for guidance; but they appear hardly to receive from seamen the attention they deserve. Indeed Raper's book is not yet in such general use as it deserves to be, the far less perfect work of Norie still holding its ground from various reasons. In this book the subject is not referred to, and in the Admiralty manual it is disposed of in a few lines.

It may not therefore be out of place to discuss the subject at some length, pending the issue of authoritative instructions, which are much to be desired; and it is proposed to consider in this paper, in the first place, the recorded causes of false reports and alarms, and then to point out how the navigator should proceed to verify the existence of a supposed danger; what steps he should take to determine and record its position; and how and to whom the report of the discovery should be made. Another not less important matter to be dealt with, will be how the navigator should proceed on discovering an error in a published chart, or what he considers to be an error.

A general rule, which should be made obligatory, may here be indicated, and the words of Raper can hardly be improved.—"No commander of a vessel who might meet unexpectedly any (hitherto unknown) danger, could be excused, except by urgent circumstances from taking the necessary steps both for ascertaining its true position, and for giving a description as complete as a prudent regard to his own safety allowed"; to which may well be added "or who makes a report of a shoal without having taken proper steps to place its reality beyond a doubt."

It may be well, at this point, to give some recent instances of the unbusinesslike reports here complained of. The following are taken at random, from last year's newspapers, and are of course not put forward as the only cases which have occurred during the year:—Firstly, here is a good specimen from the *Homeward Mail* of 12th of September:—

"ONE OF THEM.

"The 'James C. Stevenson,' while on her voyage from Galle on August the 8th, when nearly opposite Kalutara, and 3 miles off the land, running at $9\frac{1}{2}$ knots, suddenly struck a rock amidships. So great was the shock that for a minute or two the captain and officers quite expected they would have to cut away the masts, but on sounding it was found no severe injury was sustained. A smash among the crockery seems, in fact, to have been the only bad result, although passengers lying on the skylights at the time were

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nearly thrown over on to the deck with the force of concussion. There was not a trace on the captain's chart of any rock near the place where he struck—nor indeed within two miles."

This is very incomplete, no bearings are given, the position only vaguely indicated, and it does not appear from the report that a *single cast of the lead* was taken, either before or after the event—the only sounding in fact seems to have been made by the carpenter, of the ship's well, to see if she made any water. It says she struck a rock *amidships* and passed on, which is almost unprecedented. If credit be attached to this report, a search "nearly opposite Kalutara" (probably Calura of the Admiralty chart) might occupy weeks before the rock was found or its existence satisfactorily disproved. The ship was probably much nearer the land, or else one feels disposed to attribute such a shock to a large fish: soundings taken directly after the event would on that coast have been conclusive as to the distance off shore. Of course the original report in all these cases may have been more complete. No notice had been received at the Admiralty of this report up to January, 1875.* Secondly:

"SUPPOSED ROCK IN THE ATLANTIC.

"The *Baltimore Sun* of the 30th of October says:—'The curious yarn of Captain Picasso, of the Italian bark 'Teressa' (*sic*), which arrived at Queenstown, Ireland, on October 2nd, from New York, to the effect that he had sighted on the 9th of September a large rock in latitude 40° N., and longitude $62^{\circ} 18'$ W., has occasioned much comment, but little credibility. The existence of 'rocks' in the Atlantic at various points in and bordering on the Gulf Stream has been reported on various occasions before, and they have been designated on charts, but scientific investigation has invariably shown them to be myths. The 'rock' of Captain Picasso is quite effectually exploded by Captain Putscher, of the North German Lloyd steamer 'Berlin,' now at this port, who states that on the 16th of September, in $41^{\circ} 1'$ N., and $60^{\circ} 43'$ W., he sighted a floating object, copper mounted, which proved to be the wreck of a vessel about 130ft. long; and Captain Urdütsch, of the 'Braunschweig' also of the North German Line, reports having sighted on the 8th of September, in $39^{\circ} 37'$ N., and $61^{\circ} 7'$ W., a floating wreck from 160 to 170 feet in length. The differences of location are accounted for by the difference in time of the observation, and the drifting of the Gulf Stream, which at this season drives rapidly north. The differences as to the dimensions of the objects are of little consequence. That the rock of Picasso was the wreck observed by the two German captains there seems hardly room to doubt, and it is considered likely that it was one of the victims of the hurricane of the 7th and 8th of September."—*Times*, November, 1874.

No comment on this is required; a man raising an unfounded alarm of fire in a crowded theatre is hardly a worse offender than the originator of such a report as this. It is, indeed, fortunate that the "rock" was seen by other and more competent observers than the master of the 'Teressa.' The lead seems not to have been thought of.

* Since the above was written a reef is officially reported 2 miles off shore near this place.

The third instance is also from the *Homeward Mail*, and of the date 12th August.

"The steamer 'Scotia,' when steering for the port of Coconada, on July 4th, with Hope Island Lighthouse bearing north-west, and distant about 19 miles, suddenly struck soundings on a shallow patch, and got on successive casts of the lead 7, 6 and 5 fathoms, and after the last cast there was no bottom found at 20 fathoms. This would indicate a shallow patch to the south-east of Hope Island, and in a position where no soundings are marked on any of the existing charts. As this occurred at 3 A.M., no discoloration of water could be seen at that early hour, for on a spot with so small a depth as 5 fathoms, it would be naturally indicated by the colour of the water especially when surrounded by great depth."

This is said to have been reported to the Madras Government. It is also very unsatisfactory, although at first sight it appears plausible. It appears as if the lighthouse was in sight at the time of the occurrence, whereas the light in question is only 83 feet above the sea, and consequently not visible at the outside more than 15 miles; and no data are given as to how the ship's position was ascertained, or whether the ship was stopped for the lead, &c. Further, the report was made to the *wrong authorities*, or perhaps it was the Madras Government that should have known where to forward the report, for up to January 1875 no information on this discovery, if it be one, had reached the Hydrographic Department in England. These instances must suffice for the purpose of illustration.

ILLUSORY APPEARANCES.—The following are the principal appearances recorded, which have been mistaken for dangers; they are given as gathered together by Raper, with some additions from personal experience. The list does not, however, pretend to be final, or preclude the possibility of the existence of other similar causes.

In a moonlight night, when blowing fresh, it is easy to fancy breakers and shoals, especially when on the look out for them. Effects of light and shade have so much resembled breakers as to raise alarm; and sunbeams in the horizon seen through rain have been taken for rollers.* The shadow of small clouds on smooth water, especially if it be of pale green colour, or muddy, often exactly resembles a reef of rocks. Clouds and fogbanks often resemble land so much as to deceive an experienced eye. The vapour line near the margin of ice in the polar regions is always taken for land by novices.† Many reported islands or shoals, of which the accounts given have been apparently circumstantial, have, doubtless, been trees, fish (alive or dead), or ice islands, or even a water-logged derelict vessel. Phipps‡ records that he took a small piece of ice covered with gravel for an island. Weddell§ states that it was only on passing 300 yards from an ice island that they ascertained it was not solid land, but ice covered with black earth. He also mentions having taken the swollen carcase of a dead whale for a rock. An iceberg,|| which had

turned over unperceived, presented a new surface covered with earth and stones, so like an island, that nothing but landing on it convinced the observers to the contrary. A supposed rock* has turned out on examination to be a large tree covered with weeds and surrounded by fish. Whales† have probably been taken for rocks. These fish float at the surface for a long time together, and being covered with barnacles, grass, or sea-weed, exhibit an appearance so like that of a rock, that it is often difficult to believe the contrary. Raper quotes two special instances of well-informed officers being so deceived, one of them the great hydrographer, Sir Francis Beaufort. The writer of this paper had a rock reported from aloft, in a place where none was known to exist, which, on steering for it, turned out to be a wreck, bottom up, and covered with barnacles.

The sound of breakers or of surf has often been found to be caused by a shoal of fish. Kerguelen‡ saw a large shoal of small red fish that had the appearance of a sandbank of the extent of 2 leagues, on which the sea was breaking, and the illusion was rendered the more complete by the great number of birds that accompanied it. Captain Fitzroy also observes that a shoal of fish seen under the water may have given rise to a report of a bank, which it much resembles. Weddell records being alarmed in a fog by a cry of breakers, for which a noise produced by fish was taken. Reports of shoals have also frequently arisen from the collision of vessels with whales or other large fish. The writer remembers a report of bottom being obtained, owing to an albacore darting at the lead, which passed through his gills, and the fish was thus captured.

It has been remarked that it is very difficult at a distance to distinguish straggling ice and breakers from each other. A sound like that of guns§ is produced by the splitting of large masses of ice.

The surface of the sea in some parts of the world is occasionally found streaked for leagues together, by a matter which produces the "discoloured" aspect of shoal water, generally supposed by sailors to be the spawn of fish. This appearance is often startling even to those who have frequently seen it, and in those seas especially where coral reefs abound, demands a degree of care in approaching it. Banks of seaweed may be another such deception. The colour and appearance of these discolorations is very various, and the false impression is much strengthened when, as is often the case, a hasty cast of the hand-lead only is taken with the ship going fast through the water, and an imaginary depth "sung out" by the man in the chains. Raper observes, in conclusion, very justly, that accounts of new land or dangers, which are published from time to time, are not to be received without extreme caution, unless they state some circumstance which is decisive.

But the question of what is decisive does not admit of a short answer: as a rule, *seeing* only an appearance of danger cannot of itself be considered conclusive, without *feeling* it, either by the lead, or by landing on it. The cast of the lead must be satisfac-

* Voyage of H. M. S. 'Sulphur.'

† Sir James C. Ross.

‡ Voyage to North Pole in the 'Racehorse,' and 'Carcase' (sic), 1773.

§ Voyage towards the South Pole, 1822.

|| Sir James Ross.

* Wilkes' United States Exploring Expedition.

† Horsburgh.

‡ *Relation d'une Voyage dans le Mer du Nord, 1767-8.*

§ Cook's 1st voyage.

tory and certain; a cast obtained with a well "armed" deep-sea lead, when the ship's way is stopped is of itself conclusive. As has been seen above, a vessel striking and passing on would not be conclusive without further corroboration.

Thus the subject that next demands attention is, What is a discoverer to do to establish the reality of his first impressions?—and it is in the discharge of this important duty that the greatest remissness or want of knowledge is often shown. There is also a natural disinclination on the part of the Hydrographic Department to admit shoals on their charts the existence of which is not satisfactorily defined.

At least one such careful cast of the lead should be obtained whenever there is reason to believe the ship is in soundings, from the appearance of the water or a rock or land being reported in sight; or whenever, if the ship is in soundings, the water appears shoaler than there is reason to expect. In the case of a dangerous shoal or rock, or what appears such, it should further be approached cautiously as nearly as prudence will admit, and it is surely not too much to expect that, if the weather be fine, a boat should be sent to make sure of its nature, especially if no bottom can be got from the ship. Any specimen of the bottom obtained should be carefully preserved. Reports of soundings having been obtained are open to grave question, unless the rate at which the ship was going through the water at the time is quite clearly given; and also unless it is known that the cast was taken with the deep-sea lead, and was not a mere hurried cast of the hand-lead. Soundings should be continued as long as on the shoal, and until the normal depth of water is again met with. The fact cannot be doubted that when a seaman is sent to the hand-lead on appearance of shoal water, he is too liable to imagine, firstly, that he is expected to get bottom, then that he ought to, and lastly, that he actually does get bottom. In all cases the lead should be used as recommended above, and no doubt should be suffered to exist of the correctness of the soundings. The sight only of supposed land is seldom conclusive, even if people could be seen on it. Indeed, nearer examination would be called for in this case, if it were possible; they might be a party in distress on an ice island.

From the time at which any such discovery is made a most careful log of the vessel's course and proceedings, with the times of each sounding, and of alteration of course, with everything that could affect the ship's dead reckoning, should be kept up to the next observations for latitude and longitude. We here pass to the subject of determining the position and extent of the danger.

The time, by ship's clock, of the discovery and that of leaving the shoal water is important, as in such circumstances it is natural to estimate the duration of the period of anxiety as much in excess of what it really was. Bearings of land, if in sight, or angles should be taken as soon as possible after the discovery. I recollect the first order of a surveyor of my acquaintance, whose ship got ashore, was, "Quartermaster, hand up my sextant." Without going to this extent of enthusiasm on the subject, early observations are all important.

Where additional observations are made, it is not

necessary that the officers of the ship should make all the calculations: this may relieve anxiety on the score of the extra trouble to be caused by a proper report; but what is indispensable is, that a systematic record of the occurrence should be kept and sent in. A few plain directions shall now be given: and it is not intended in this article to trench on the province of the surveyor, but merely to act as a guide to the average navigator, and to confine ourselves to the essentials. They are here collected from various sources, and a few hints only are original; and in the first place as to how observations are to be recorded.

In all observations it must be clearly stated how the latitude and longitude were determined; whether astronomically or by crossbearings or angles, or by account only; and the original observations should be sent in all cases, as well as the calculated results, if the computations are made, and a copy of all the calculations made should be attached.

With reference to the instruments, the maker's name, and number of each chronometer, if more than one, and the size and maker's name of each sextant, quadrant, or compass used should be given. If compass bearings are used, the uncorrected compass bearing should be given as read off, and the correction for local deviation given in a separate column, with a note of the time and manner it was last ascertained: the direction of the ship's head at the moment should be also noted, the corrected reading being given separately.

Observations with sextant are to be entered in the observation book exactly as taken, the reading of the sextant is to be written down uncorrected, and in a column by the side of this should be written the correction for index error with a statement whether it is to be added to or subtracted from the reading of the sextant. A reference should be added to the observations by which the index error was determined. To avoid any possibility of error another column should contain the corrected angle. It is preferable that the index error should be noticed at the time of the observation, and the measures by which the index error was ascertained should be written down exactly in the manner in which they were made, so that any other person can calculate for himself the value of the index error.

For altitudes, the height of the eye, the depression of the horizon, and the altitude corrected for dip should also be stated. The time of making every observation should be entered exactly as it is read from the chronometer, or hackwatch, and the error of the watch on Greenwich time should be placed near this, followed by the corrected time. In some convenient place must be given all the observations by which the errors of the chronometers were determined, giving place, date, and whether rated before or after they were put on board. If a hackwatch be used, the comparison of the watch with each chronometer must be given.

A copy of the ship's log from the time of the last astronomical observation (or departure, if land was in sight) preceding the event, to the noon following, or to the next observations for latitude and longitude, is required. It should contain the uncorrected courses, local deviation, and corrected courses, and should give the ship-time of every occurrence,

with amount of *correction* of dial at the noon following, and nothing should be wanting to render the "day's work" as complete as possible. It should be stated how the ship's speed was measured, whether by common log, patent log, or estimate from revolutions of engine, &c. The amount of error of lead-line, which should be measured at the time (after use), should be given. If from any cause any entries are subsequently added, or not made at the time, they should be distinguished and the date of entry given.

In giving the ship's time for the occurrence, it should be stated whether civil, or astronomical, or nautical log-book time, the former being preferable.

With regard to the hydrographical observations that should be made, it is beyond the limits of an article like this to indicate the method of making even a running survey; a special book should be consulted, and for the unprofessional mariner, the unpretending little work of Captain Hull, R.N., called *Practical Marine Surveying*, which costs a mere trifle, may be recommended as combining every requirement, and it is written in plain sailors' English, for the use of persons unacquainted with surveying. However, it is seldom a survey of even a rude description can be hoped for, but while in sight, bearings, or better still, sextant angles, should be taken at intervals, of the most remarkable objects, noting the exact time of each set of bearings, also altitudes of peaks above the horizon, to be taken both "on" and "off" the sextant. If any sketches of the land can be made they will be valuable.

The latitude and longitude of the ship should be determined as carefully as possible, as soon after the discovery as an opportunity offers, by the usual methods. Observations for time should be made both A.M. and P.M., or a star near sunrise or sunset, when the horizon is well defined, gives good results. On making the first known land after the occurrence, the chronometer should be checked by observations, if possible, on shore; if not, by taking an observation for time when in the meridian of the land.

The details of the last astronomical observations, or departure by bearings of land, previous to the discovery, should also be given.

The longitude from Greenwich, or meridional difference from last place where the rates were observed, should be given separately, and if the chronometers have been rated by the officer's own observations, the longitude adopted for the rating station must be given, and the exact place of observation described clearly. Raper observes "It will, indeed, be evident on a moment's reflection, that the longitude described merely, as is too often the case, as 'longitude by chronometer,' without reference to some fixed point, is utterly valueless. Again, when such fixed point is mentioned it is no less necessary to note the longitude adopted; for instance, 'Longitude by chronometer from Callao' is little better than no allusion to place at all, as Callao appears in the tables in different longitudes from $77^{\circ} 4'$ to $77^{\circ} 14'$."

As the observer has better opportunity of forming an opinion on the relative excellence of his chronometers, he should give an estimated mean, in which greater weight would be attached to the result as given by the better watches, in addition to the arithmetical mean of the meridional differences.

If the lunar observation is available, it would be important to take at least two sets of distances, one on each side of the moon if possible.

If known land is in sight, no astronomical observations can supersede the necessity of bearings of the land, or better still, a "round" of sextant angles. It is to be regretted that the simple art of taking horizontal angles with a reflecting instrument is so little practised. If the peaks or objects on shore cannot be identified with any delineated on the chart, it is no reason they should not be observed, and a description, or better still a rough sketch, should be appended. Bearings of extremes of land are very valuable when not so distant that the beach is "down" or below the horizon. If angles are taken, a good compass bearing of *one* object should be also given, or if a true bearing be observed, it will add greatly to the accuracy of the result. A good bearing of two objects when in a line, or "in one," is always of great value, especially if a sketch be given showing their appearance. No information can be too trivial to be recorded, and all remarks should be written down *at the time*, nothing being trusted to memory. Notes might be dictated from time to time to the officer who should be at once detailed to note time, lead, &c.

Much more might be said on this subject, but a reference to Raper's book, 7th edition, pp. 281, 333, 337 and 359, will furnish most of the necessary details. The Admiralty Manual contains brief instructions for a running survey, but presupposes, perhaps, more knowledge of the subject than is possessed by the average seaman. Captain Hull's little book is probably the best work available for a person with no previous knowledge.

The report of the discovery should in all cases be made to the Hydrographer of the Admiralty direct, or to Lloyds, or, in India, to the Superintendent of Marine Surveys at Calcutta; and to avoid such reports being withheld from financial considerations, it would be well if it were clearly understood that no expense need be incurred for postage, if the letter be addressed "on Her Majesty's Service." A few blank forms with a brief abstract of instructions printed on the face of each might perhaps be advantageously distributed to every ship proceeding on a voyage beyond our own coasts; or it might be the best plan to have a few such forms bound up with every official log, which might be detached and sent in as occasion required. If an attempt at a survey or plan be made, however rough, the original should be retained on board, and a tracing sent in with the report.

The question bids fair to assume such dimensions as to call for a special branch of the Hydrographic Department to receive and deal with such reports.

This paper has already extended to such a length, that the last subject, viz., that of errors in existing charts, must be dealt with somewhat briefly.

There are still many parts of the world of which the charts are incorrect or incomplete, as is often obvious on mere inspection of the sheet. Emendations of such portions, or reports of unexplored dangers in such localities, are always valuable. The date of the chart will often furnish a guide as to its completeness, and unsurveyed, or only partially explored parts are represented in all new charts by a distinct style. But if the coast be well surveyed, reports of new shoals

will require the most exact and circumstantial data to be given before they can be entertained; and the mariner, especially if not a practised surveyor, should in the first place, put the fact beyond a doubt, that the error may not be in his own observations or reckoning. Raper gives careful instructions for estimating the "degree of dependance" of ordinary observations.

When a ship gets into difficulty or danger, the general, and indeed very natural practice, seems to be at once to lay the blame on the chart, which is forthwith reported, as "out" in latitude and longitude, or "that the reef was not laid down on the chart," &c. Many instances of such reports must occur to every surveyor, and in some cases at least have been made to screen neglect or reckless navigation on the part of the master. The writer remembers, in 1860, passing the wreck of a merchant-ship on the Katiwar coast, lying not above a cable's length from high-water mark, on a coast as free from danger as any in the world, the master of which, on arrival in Bombay, had reported the vessel lost on a reef of rocks not laid down on the chart.

But it is needless to multiply instances of the sort: and if these remarks induce seamen to be more careful in condemning charts without sufficient warrant, and to make every possible verification of the supposed error, and lastly to include in their report all their observations at full length, they will have attained their end.

It is not imagined that this paper contains anything new or startling; it is written in plain words, in the hope of attracting the attention of seamen, and of directing the attention of the public to what the author considers a great and growing evil. The difference in amount of trouble to the discoverer between a proper, honest report, and a defective and useless one, is so slight, and the difference in value to the maritime world so great, that it seems to call for some decisive action on the part of the powers that be, and if, as a preliminary, the Admiralty were to publish detailed, plain instructions, it would be a valuable step in the right direction.

ARTHUR W. STIFFE.

SIR HENRY KELLETT, K.C.B.

A LITTLE more than two years ago we had to record the death of Sir Robert M'Clure,* and now another of our Arctic worthies has passed from among us—the distinguished officer who rescued M'Clure and his gallant crew, and under whom the Commander of the expedition that is about to sail acquired his Arctic experience.

Henry Kellett entered the Navy in 1822, and was three years in the 'Ringdove,' on the West Indian station. After a short service in the 'Gloucester' (74), he went to the Coast of Africa in the 'Eden' (Captain W. F. Owen), in 1827. During part of his service there he had the command of the 'Cornelia' tender. The great sickness and mortality among the officers, having caused a number of vacancies, he was promoted to the rank of lieutenant in 1828. In the latter part of the commission he performed the duty of First Lieutenant. Returning to England in 1831, he joined the 'Ætna' (Captain Belcher), and proceeded again to the Coast of Africa on surveying duty. In the sickly season the 'Ætna' was sent

to the Douro—the town of Oporto being then besieged by Don Miguel. He here saw much hard service in the Bar boat while maintaining the communication with the fleet outside. In 1833 he went again to the Coast of Africa as First Lieutenant in the 'Ætna,' under Captain Skyring, and was present when that officer was treacherously murdered by the natives; he then succeeded Lieutenant Arlet in the command of the 'Raven.' In 1835 he was appointed to the command of the 'Starling,' tender to the 'Sulphur' (Captain Beechey), for the survey of the Pacific. On the arrival of the ships at Valparaiso, the state of Captain Beechey's health compelled him to return to England, and Kellett received an acting order as commander of the 'Sulphur,' which he held until February 1837, during which time the coast was surveyed from the river Guayaquil to the Bay of Choko.

When Captain Belcher arrived from England at Panama and took command, Lieutenant Kellett returned to the 'Starling.' Proceeding along the coast to the northward, surveying different harbours *en route*, the two vessels crossed over to the Sandwich Islands, and then proceeded north to the 60th degree of north latitude, to fix the position of Mount St. Elias. On the way south Sitka and Vancouver's Island were visited, and the coast of Mexico; the two vessels reaching Callao on June the 3rd. Returning to the north the survey of the coast between Panama and Mazatlan was continued, and the Sandwich Islands and North-West Coast of America revisited. On December 21st, 1839, the ships proceeded on their homeward voyage round the world, touching at the Marquesas and Bow Island, where they attempted to bore through the coral, but only reached 45 feet when the auger broke. The vessels then touched at Tahiti, Fiji, and New Ireland, and visited the Moluccas, arriving at Singapore on the 16th of October, where orders were found for them to proceed immediately to China. In passing up the Salawan Passage the 'Starling' was struck by lightning, having her foremast, topmast, and top-gallant-mast shattered, and three of the crew wounded by the electric fluid. Arriving in the Canton River on December 14th, 1840, the two vessels proceeded at once to the Bogue, which was reached in time for them to take part in the capture of Chuenpu and Tycocktow, and the capture of the Bogue Forts and First Bar Barricade. By dint of much sounding, a passage was found for vessels of 14 feet draught, to the southward of Danes Island, and the ships being safely piloted, Canton was reached by the Macao Creek instead of Whampoa. This made it practicable to attack the city from two sides, which resulted in a capitulation being signed by the Chinese on May 27th, 1840.

In these operations Lieutenant Kellett is thus officially mentioned in the despatches:—

January 7th.—"High commendation of Lieutenant Kellett for conducting the 'Queen' steamer into action at the capture of Chuenpu and Tycocktow."

March 18th.—"Capture of Canton."—"To Lieutenants Kellett and Collinson, and Mr. Brown, master of the 'Calliope,' every consideration is due for having made themselves particularly useful in sounding, and afterwards conducting several men-of-war safely to an anchorage off the city of Canton."

Lieutenant Kellett for these services received his promotion to the rank of commander on May 6th, but owing to constant exposure and fatigue he was laid up with rheumatic fever for two months. On the arrival of Sir W. Parker and Sir H. Pottinger, the fleet proceeded to the northward, leaving the 'Sulphur' and 'Starling' at Hongkong; but Sir William, feeling the value that another surveying vessel would be to the expedition, ordered the 'Starling' to join the fleet at Chusan. Not being able to make way against the monsoon, she was obliged to remain at Amoy until the spring of 1842, and during this detention Kellett made an elaborate survey of that harbour. Joining the fleet in April 1842 he took

* See *Ocean Highways*, for December 1873, p. 353.

part in the capture of Chapoo, placing buoys for the position of the fleet, and accompanying Sir H. Gough from the landing-place of the troops to the escalade of the city.

When it was decided (mainly in consequence of his advice) to make the next impression on China, by way of the Yangtse-kiang, the piloting of the fleet was entrusted to Commander Kellett by Sir W. Parker. The fleet was thus brought into the river in safety, a feat which is thus spoken of by Sir W. Parker in his despatches.

'The intricate parts of the Channel delineated in Captain Bethune's chart having been previously buoyed by the surveying officers, the fleet succeeded in reaching the limit of that officer's valuable researches within 2½ days, and every subsequent difficulty has been most commendably overcome by the unremitting exertions of Commanders Kellett and Collinson, assisted by other surveying officers and the masters of the fleet.'" On reaching the entrance of Woosung it was necessary to ascertain whether there was sufficient depth of water for the fleet opposite the batteries. This difficult task was undertaken by Kellett after dark, and a buoy placed within half a mile of the principal battery. The Chinese army which had been brought down to the beach to oppose the landing, gave a general shout which was heard by the fleet outside, and led to the impression that the surveying officers had been captured. Fortunately no Chinese fired; otherwise, the destruction of every one in the boats was inevitable, but by letting them drift quietly out the fleet was reached and the forts captured without loss, and the ships were carried safely into their positions on the following morning.

He next proceeded with the fleet to Shanghai, and assisted in the capture of that place. Sir W. Parker, in his despatch on this occasion, fully recognised the value of these services:—"Commander Kellett's zeal on this service and every other on which he is engaged exceeds all praise. From here the river was unknown, but by aid of the small steamers and the staff which the Admiral placed under his command, every difficulty in navigation was overcome and the fleet safely conducted through an intricate navigation to Chinkiangfoo." After the capture of this city the surveying vessels were ordered to examine the river, and having found a navigable channel to Nankin, the fleet was safely conducted to an anchorage off that city.

Sir Henry Pottinger, in his despatch to the Earl of Aberdeen, thus expresses himself:—"Before I proceed to the chief object of this despatch I beg to premise that although I doubt not in the slightest degree that Vice-Admiral Sir W. Parker will bring to the particular notice of the Lords of the Admiralty the merits of all officers serving under his orders; yet, feeling as I do, from immediate personal observation, that much of the successful result of the expedition has sprung from the extraordinary zeal and unremitting labours of the survey department, I am sure your Lordship will not deem me to be going beyond my province if I mention as deserving, in my opinion, of the special consideration and favour of Her Majesty's Government, the names of Commanders Kellett and Collinson and the officers employed with them on that most important branch of the public service; and I think it only right to add that I venture this recommendation entirely unknown to the valuable officers who are the subject of it."

During the time that the Treaty was being arranged, the regular survey of the river was commenced, and after the fleet had been safely piloted to sea, it was completed before the surveying vessels left the river.

It being of great importance now that ports in China were opened to British commerce, that the access to them and the coast between the Yangtse-kiang and Amoy should be laid down correctly, the 'Starling' and 'Plover' were detached for this service, and at Hongkong the charts were at once reduced, and with the sanction of the Commander-in-Chief, were placed in the hands of the

Chinese chart copiers, so that access was given to information which was necessary to render the navigation of the China Sea safe. On his arrival at Amoy, Commander Kellett had the satisfaction to learn that he had been promoted to the rank of Captain and made a Companion of the Bath. The Admiralty, in further recognition of his services, ordered the 'Starling' to be rated as a ship which enabled him to retain his rank and to serve his time. The Emperor of China having ratified the Treaty, Captain Kellett was selected by Sir W. Parker to carry his despatches to England.

After a sojourn of some months at home Captain Kellett was selected by the Admiralty to commission the 'Herald,' and, in company with the 'Pandora,' to proceed to the Pacific to continue the survey of that ocean. Taking up the survey at the Bay of Choko, the coast-line was laid down to the Bay of Panama. On the approach of the rainy season the vessels proceeded to Vancouver's Island, and commenced the survey of the Straits of Juan de Fuca.

In the latter part of the year 1846 the vessels proceeded to the southward, and while surveying in the neighbourhood of Acapulco Captain Kellett and four officers were taken prisoners by the Mexicans, under the impression that they were officers belonging to the United States, then at war with Mexico. After a detention of eight days, during part of which time they were in serious danger of losing their lives, they were liberated. The 'Herald' then returned to Panama and Callao to recruit; and the survey of the coast of Ecuador was resumed in August. In April 1848, on their return to Panama, orders were received for the 'Herald' to proceed to Behring Straits to assist in the search for Sir J. Franklin. Visiting the Sandwich Islands and Petropaulowski, the 'Herald' reached Kotzebue Sound on September the 14th, whence, after waiting for the 'Plover' until September 29th, when the setting in of winter warned them to depart, they returned south. In 1849 the 'Herald' again proceeded to the north, and reached Kotzebue Sound on July 15th, where she found the 'Plover' just arrived. Proceeding immediately to the north, Lieut. Pullen was despatched from Wainwright Inlet in two boats to search the north coast as far as the Mackenzie River. The 'Herald' proceeding to the westward discovered an extensive range of mountains in the north-west, being the land which the natives had reported to Baron Wrangell as having often been seen from Cape Jakan. After landing upon an island and taking possession, the 'Herald' returned to the south. In 1850 Kotzebue Sound was reached on the 6th of July. Proceeding to the north, the 'Investigator' was fallen in with on the 31st, and the 'Herald' returned to the southward. Visiting the Sandwich Islands, Hongkong, the Keeling Islands, and the Cape of Good Hope, the 'Herald' reached England on June 6th, 1851.

On the return of Captains Austen and Ommanney from the Arctic Regions in 1851, the Government determined to send the 'Assistance' and 'Resolute' back to continue the search. Sir E. Belcher was appointed to command the expedition, and Captain Kellett to the 'Resolute,' with the 'Intrepid,' under the command of M'Clintock, as tender. The squadron left the North on April 21st, 1852, and after touching at the Whale Fish Islands, Godhaven, Lievely, and Upernavik, the North Water was reached on July 28th, and Beechey Island on August 11th. Leaving Beechey Island on the 15th, the two vessels were stopped by the ice in the neighbourhood of Dealy Island, where they passed the winter. Lieutenant Meham was despatched to Winter Harbour, and there found Captain M'Clure's despatches. In the spring parties were despatched to search the shores of the Parry Group, and Lieutenant Pim was sent across the Straits to Banks' Land, where he found the 'Investigator' still detained in Mercy Bay. Captain M'Clure immediately came over to the 'Resolute,' and as the escape of the 'Investigator' was hopeless Captain Kellett, after due consideration, ordered the

vessel to be abandoned. After a vain attempt to reach Beechey Island, the two ships were compelled to pass the winter in the pack. In the spring Lieutenant Meham was despatched to the Prince of Wales Straits, where he obtained information concerning the 'Enterprise'; so Captain Kellett had the satisfaction not only of rescuing the crew of the 'Investigator' from their perilous position, but of bringing to England the news of the safety of the 'Enterprise.' In April orders were received to abandon the vessels, which was done on May 15th, and the retreating officers and crews reached Beechey Island on the 28th. Captain Kellett returned to England in the 'Phoenix.' At the conclusion of the court-martial which was held in consequence of the abandonment of the ships, the President observed that he experienced much satisfaction in returning Captain Kellett his sword, which he had worn with so much credit, satisfaction and advantage to his country.

In 1854 Kellett received the appointment of Commodore in the West Indies, where, owing to the complications arising from the slave trade to Cuba, and the wars in Mexico and Central America, difficult diplomatic questions arose which called for immediate action, and such was the confidence which Her Majesty's Government felt in the Commodore's ability and discretion in dealing with these matters, that they extended his period of service from three to five years. This, however, told upon his constitution, and he was laid low by a severe attack of yellow fever. On leaving the station, the merchants of Kingstown presented him with a service of plate, as an acknowledgment of their respect for him, and in recognition of the value of his services.

Obtaining his flag-rank in 1862, his services were acknowledged in 1864, by the appointment to the post of Admiral Superintendent of Malta Dockyard. While there the preliminary works of the new docks and extension of the dockyard were commenced, and many there are who now remember the admirable way in which he maintained that hospitality for which his country is so justly celebrated.

In 1869 he was appointed to the command of the fleet in China, and just before leaving England, while on a visit to a friend, was thrown from a dog-cart, and suffered such injury that, for a time, it was thought he would not be able to take up his appointment. Indeed, his relations were most anxious that he should not do so; but directly he regained his strength the desire for active service was so strong that he would brook no opposition. The anxieties of that command, comprising as it does a larger number of vessels than any other, told upon his constitution, and while awaiting the arrival of his successor, he had the misfortune to be struck by a *coup de soleil*. Returning to England in impaired health, it was hoped that quiet and rest would restore him, and he retired to his country seat, Clanacody. These hopes were, however, doomed to be disappointed, and last year he was seized with a paralytic stroke, from which he only partially recovered, and at length gradually sunk to his rest, without pain, on the evening of the 1st of March 1875.

During an active service of forty-one years abroad he was for six years on the coast of Africa, eight in the West Indies, five on the China station, two in the Arctic Regions, and ten on the Pacific Station. He was a Fellow of the Geographical Society, and a Member of the Geographical Club.

Hearty, joyous, open in his manner, he gave pleasure wherever he went. Fond of his profession, a first-rate sailor, a good surveyor, he delighted in hard work, and when work was done, was foremost in play. He has left behind him a memory which will be cherished by all who had the pleasure to know him, and many there are who sorrow to think they shall see him no more.

Reviews.

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ENGLAND AND RUSSIA IN THE EAST.*

THIS important work contains the most recent as well as the earlier results of Sir Henry Rawlinson's experience, and of his study of Persian and Central Asian politics and geography. It thus enables all Englishmen, who take an interest in public affairs, to acquire a knowledge of a difficult subject which affects the welfare of this country very closely, from the very highest authority.

The first chapter is a reprint of an article in the *Calcutta Review* on our political relations with Persia down to the accession of Muhammad Shah in 1848, and the second chapter continues the narrative to the present day. The record commences with Lord Wellesley's attempts to embroil Persia in a war with Afghanistan, in order to prevent Zaman Shah from invading the Panjáb; and, during the seventy-seven years that have elapsed, our diplomatic intercourse with Persia has been guided by no settled or continuous policy. This must strike every reader. The history commences with an unseemly clashing of two envoys, with different instructions and opposite views; and the succeeding events are but a continuation of this beginning. At one time we make a defensive and offensive alliance coupled with a promised subsidy, at another we evade the treaty and refuse payment of part of the subsidy; at one period we attempt to create a Persian army disciplined by English officers, at another we treat Persian affairs with indifference and neglect; sometimes we intrigue with Persia to invade Afghanistan, at others the Afghans are urged to threaten Persia; while the conduct of negotiations is sometimes placed under the Indian authorities, in order that they may be conducted from an Eastern point of view, while at others all the appointments are made by the Foreign Office, and filled by diplomatists whose knowledge is confined to the politics of Europe. The inevitable consequence of this absence of continuity in our policy is that Persia, instead of being, as she might easily have been made, a firm and steady ally and a bulwark to our Indian possessions, is a mere Russian outwork.

A second reflection that the perusal of these essays will inevitably give rise to is, that serious injury is done to the interests of England by the extraordinary want of geographical knowledge among the statesmen and some of the diplomatists who have conducted negotiations relating to these countries. An inexcusable ignorance of political geography was betrayed in the Morier and Ellis Treaty of 1814; and, not to quote other instances, the recent negotiations with Russia respecting the northern boundary of Afghanistan furnish another striking example of the danger of such ignorance. Lord Clarendon gave a map to Prince Gortschakoff as correct, and upon which negotiations might be based, that made the

* *England and Russia in the East.* A series of papers on the Political and Geographical condition of Central Asia. By Major-General Sir Henry Rawlinson, K.C.B., F.R.S., President of the Royal Geographical Society. Formerly Envoy and Minister at the Court of Persia. With map. Murray, 1875.

Indian Caucasus the boundary of Afghan territory; and when Russia, on the strength of this map, made a proposal which would have given her the right to absorb all Afghan Turkistan south of the Oxus, our Foreign Office was not aware of the extravagance of the proposal. Fortunately the India Office had the advantage of the advice of statesmen with profound geographical knowledge; and a ruinous concession was prevented.

Certainly some of the dangers to which our interests in the East have been exposed, during the last half-century, have been caused by an absence of continuity in our policy, and by ignorance of political and physical geography on the part of English officials.

To geographers the four last chapters of Sir Henry Rawlinson's work, on the geography and politics of Central Asia, are the most valuable. Two, comprising the third and fourth chapters, are reprinted from the *Quarterly Review*, the fifth is a state paper of great importance which changed the "masterly inaction" policy of Lord Lawrence to one of wise and friendly interest in Afghan affairs, and the last continues the narrative of Central Asian political events down to the present day.

In the first article from the *Quarterly Review* Sir Henry describes the gradual advance of the Russians up the valley of the Jaxartes; and in the second he passes in review the labours of Russian and English travellers in Central Asia, as well as the meritorious reports of natives of India who have been employed as envoys or as surveyors. The information thus brought together can be found in no other published work in a connected form, and it is here arranged with such literary skill and complete mastery of the subject that the work will for many years be the chief authority on Central Asian questions.

The Russian encroachments have rendered it necessary to define the northern limit of Afghanistan as that of the principalities and states which paid allegiance to Dost Muhammad Khan at the time of his death. The boundary may be described as the line of the Oxus from Khoja Sâleh to its source, following the main stream, and including Badakshan and Wakhân. It was generally assumed that the stream issuing from Lake Victoria, being the Oxus source discovered by Lieutenant Wood, was the line indicated. But the discoveries of officers belonging to Sir Douglas Forsyth's Mission, on the Pamîr table-land, show that the main stream of the Oxus is a river which rises in the little Pamîr Lake, running in the first instance to the east until it joins the Aktash, then turning to the north-west and circling round the elevated plateau of the Great Pamîr, where it is joined by an affluent from Lake Karakul, and from whence, under the name of Mughâbi, it flows down the great Shignân Valley, and unites with the southern branch of the Oxus at Wamîr on the confines of Roskan. This river is well known to form the northern boundary of Wakhân, and from its size, as well as its length, has every right to be regarded as the main stream of the Oxus. Sir Henry Rawlinson therefore expresses a hope that in all future maps it will be adopted as the definite frontier of Afghanistan.

As Russia has now conceded the main question of the Afghan right to Badakshân and Wakhân, she is bound to accept the established frontiers of these districts as the line of demarcation which limits her own

dependencies of Kokand and Bokhârâ to the south. But the intervening Pamîr Steppe to the northward will long form an effective barrier to invasion, and so far as Indian interests are concerned, the encroachments of the Russians on the Turkman territory east of the Caspian, in the direction of Merv, are far more important, and require very close and vigilant watching. The occupation of Merv, which is evidently intended, will place Herat, the key of India, in danger, and will be a direct menace to this country.

On this part of the subject Sir Henry Rawlinson gives no uncertain sound. His advice is bold, but at the same time prudent and thoroughly practical. In the sixth chapter the recent aggressions of the Russians in this direction, from the occupation of Krasnovodsk on the east coast of the Caspian in November 1869, are fully described, as well as the physical aspect of the country between the Caspian and the Murghab Valley, in which Merv is situated. The object of the attack on Khiva was declared by Count Schouvaloff, in January 1873, to be to recover prisoners, and it was solemnly declared that the conditions imposed on that State would be such as not in any way to lead to prolonged occupation. The truth was that the expedition was intended to destroy the independence of Khiva, and make it a Russian dependency, and when this became known, "it was felt," as Sir Henry says, "that we had been grievously deceived, that public faith had been broken, and that an Emperor's word had been weighed in the balance and found wanting." In future it will be a mere waste of time to ask for explanations, and there is nothing left for English statesmen to do but to let their intentions, in certain contingencies, be clearly understood, and to watch the course of events with suspicious vigilance. Our Government has already pointed out, in firm but courteous language, that a Russian expedition against Merv would very possibly lead to our intervention in support of the integrity of Afghan territory.

Sir Henry Rawlinson clearly shows that if Merv eventually becomes one of the bulwarks of the Russian position towards India, the danger of collision with England will assume a tangible form. He adds:—

"There is one point, indeed, the pivot of the whole Eastern Question, which must never be lost sight of—*We cannot afford to expose Herat to the risk of being taken by a Russian coup de main.* If a Russian force is sufficiently near to threaten the safety of the keys of India, we must also have a British force sufficiently near to protect it. All other questions relating to the Russian position in Central Asia are, as far as British interests are concerned, of much inferior importance to the Turkman expedition and its results. . . . The present expedition against the Turkmen is merely one of a series of movements that will almost infallibly lead the Russians to Merv."

Sir Henry then points out that the facility of taking Herat by a *coup de main* from Merv is so patent, while the consequences of that movement to British India might be so fatal, that it becomes a matter for consideration whether the Russian occupation of the one city should not be immediately followed by the British occupation of the other. There is little reason to doubt that the Amir of Kabul would acquiesce in this occupation, as an auxiliary measure of Afghan defence, and, in that case, the march to Herat, by Quetta and Kandahar, would be a mere military promenade. The garrison of Herat would be 5000, of Kandahar 3000, and of Quetta 1000 men, the greater part being, of course, Europeans. The neces-

sity for this measure is shown in the closing paragraphs of Sir Henry's work. Russia, by advancing on Merv, would evidently mean mischief. She would never embark on an enterprise of so perilous a nature for mere purposes of trade or police. The object would necessarily point to Herat, which would lie at the mercy of a European power holding Merv, and from whence India would be seriously threatened.

"If Russia," he concludes, "remained encamped on the Caspian, we should hold aloof from Herat; but, if she deliberately threw down the gauntlet, she must expect it to be taken up. We could not, as the guardians of the interests of India, permit her, on the pretext of curbing the Turkmans, or establishing a trade-route through Asia, to take up a position unopposed on the Murghab, which would compromise the safety of Herat. That city is both strategically and politically an indispensable bulwark of India, and we cannot and will not allow its future fate to be at the disposition of a foreign power."

The work is illustrated by a map of Central Asia, which, apart from its intrinsic excellence, will have a special interest for geographers. It is the last work done by Mr. John Arrowsmith, and he was busily engaged upon it during the last week before his death.* It has been made more complete by additions from recent English and Russian surveys, especially as regards the mouth of the Oxus and the rivers on the Pamir Steppe, and is, as Sir Henry Rawlinson says, the most accurate delineation, on a small scale, of the vast regions of Central Asia that is now to be obtained. The coloured political boundaries are inserted on Sir Henry's own authority, and show the line of the Shignan River, which forms the proper limit of Wakhán, as well as the correct Persian boundary along the Kuren Dagh, from near Kizil Arvat to near Sarakhs.

GUMS AND RESINS OF INDIA.†

THE treatise before us professes to be a digest of information collected from numerous and scattered sources rather than a work of original research, but monographs of this kind are most useful as a means of obtaining an idea of the great resources of India.

An elaborate and succinct classification and history is given of no less than 200 gums, resins, and oleo-resins, which are more or less Indian products, with a bibliography of each species. The materials upon which this report is based consist of a reference collection, derived from various sources, not confined to India, and, in most instances, well authenticated, and therefore useful as collateral evidence. The chief source of material was the Museum Collection, which includes specimens sent from India to the Exhibition of 1862, and all European exhibitions since that period, and from samples sent over from time to time for valuation and report.

Amongst the substances to which attention is more particularly directed, as requiring further information, are:—

1. The curious astringent Mochurrus.
2. The different kinds of Assafoetida, and the plants yielding them.
3. The peculiar gum-resin called Sarcocolla.
4. A tree yielding a peculiar kind of Myrrh, 40 miles eastward of Aden.
5. The source of Black Resins from Burma with an Elemi odour, called Pwainyet, which name is also applied to other kinds of resin.

This report also indicates that a whitish resin from Burma, the produce of *Hopea odorata* and *micrantha*, is likely to meet with a ready sale here.

The reason why the wood-oils, gums, &c., have not as yet found a good market are explained. New, unknown, and untried substances never obtain a full valuation until their qualities have been thoroughly tested. When some special application has been discovered, then only is the true value of the product known, and, until a demand has been created by practical demonstration of its utility, such a substance cannot obtain a remunerative price. It is not so much by valuation and report as by a series of well-conducted experiments that the true value of an unknown substance can be determined. However valuable, intrinsically, an article of raw produce may be, it will not at once, nor for some time, attain a definite rating commensurate with its value. This has been observed also in the case of the East Indian chinchona barks, &c.

It is suggested that the wood-oils are in their crude state partial solvents of caoutchouc: paper or cotton cloth is rendered waterproof by applying this oleo-resin, the only drawback being its slow drying powers.

Liquid kino is mentioned as one of the substances recently sent for report. Experiments with this astringent substance, mixed with a solution of sulphate of iron, proves that it can be substituted for galls in making ink.

The whole report is most interesting and instructive, and proves how much excellent work is being done by the scientific officers of the India Museum. Dr. Cooke is well known by his numerous works and contributions to botanical and microscopic science.

The appendix contains an exhaustive description of the trees producing frankincense, by Dr. Birdwood, who has studied this obscure subject with diligent research.

THE HAWAIIAN ARCHIPELAGO; SIX MONTHS AMONG THE PALM GROVES, CORAL REEFS AND VOLCANOES OF THE SANDWICH ISLANDS. By *Isabella L. Bird*. (Murray) 1875.

WE have here presented to us the recorded experiences of a lady who visited this distant cluster of islands in search of health, and remained there upwards of six months. During this period she wrote a series of letters, which, with a supplementary chapter on the constitution, trade, social statistics and prospects of the Sandwich Isles, are now before us, in the shape of a most readable work. The scenery of these islands affords excellent scope for the pen of the authoress, as does also the great volcano of Hale-Mau-Mau, the aspect of the crater of which must be very imposing. It forms an irregularly-shaped lake, about 500 feet wide at its narrowest part, and half a mile at its broadest, full of fiery waves, jets and fountains, and perpetually in motion. At one time it was known to sink 400 feet, and at another time

* See *Ocean Highways* for June 1873, p. 123.

† A Report on the Gums, Resins, Oleo-Resins, and Resinous Products in the India Museum, or produced in India. By Dr. M. C. Cooke. Prepared under the direction of the Reporter on the Products of India. Pp. 152, plates 4.

to overflow its banks, The volcano is the loftiest active one in the world, being nearly 14,000 feet high, and its crater is apparently quite in keeping with the dignity of the volcano, for we are informed it is more like the bottomless pit than anything else. In a region remarkable for volcanic activity, subterranean disturbances are matters of course, but the great earthquake of 1868, with its attendant horrors of rivers of fire from 200 to 800 feet wide, fountains of lava casting up rocks weighing many tons to a height of from 500 to 1000 feet, and a succession of shocks amounting to about 2000 in a fortnight, is a picture fairly to appal one. The authoress's description of the whole scene as related to her will repay perusal. The native population of Hawaii is decreasing; a matter of regret, as they have shown special tastes for European civilization. Sugar is the reigning interest on the islands, but it labours under the disadvantages of a paucity of labour and heavy import duties at San Francisco. As remedies, some talk of annexation, and some of ceding a certain lagoon as a naval station to the United States, and as a "consideration" for a reciprocity treaty, but all surrender of territory is strongly opposed by the Hawaiians. The islands are productive, but the want of a market and of labour, as well as various forms of blight, militate seriously against any development of their resources.

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VENTS ET COURANTS, ROUTES GÉNÉRALES; EXTRAIT DES SAILING DIRECTIONS DE MAURY ET DES TRAVAUX LES PLUS RÉCENTS. Par *M. Charles Ploix* et *M. Cuspari*. Paris: Imprimerie Nationale, 1874.

THIS work, published by the French Government, is a part of the *Météorologie Nautique*, and, as stated in the title page, is chiefly derived from the admirable works of the late Captain Maury. But admirable as were the works of that talented American officer, as the foundation of a system, it must be remembered that great advances have been made in meteorological and physical science since his book appeared, and this work scarcely brings up the information to the present day, as we may instance (although not bearing on meteorology) that, although the soundings obtained by the 'Challenger' in the North Atlantic are given in Plate III., the instruments and means by which those observations were obtained are not given; all the sounding instruments depicted in Plate II., and described in the second chapter, being obsolete. That the work will be of much use to the French navies there cannot be a doubt, but we do not see in it anything that will add to our own present knowledge.

GREAT TRIGONOMETRICAL SURVEY OF INDIA REPORT.

WE have received, at the moment of going to press, an early copy of the annual report on the operations of the great Trigonometrical Survey of India, and much regret that the want of space, and forward state of publication, renders it impossible to review the work in time for the present number. The report is of unusual interest. It includes accounts of the arrangements made for connecting the triangulation of India with that of Ceylon, and of the completion of the revision of the Great Arc from Cape Comorin to the Himalayas; reports on geographical exploration in Kashgaria, and on the Pamir Steppes, in connection with Sir Douglas Forsyth's mission to the court of the Atalik Ghazi, and on several additions to our geographical knowledge of portions of Great Tibet, and of Nepal, which have been obtained through the agency of native explorers. The detailed narrative reports will, as usual, well repay perusal; those by Lieutenant Gibbs, Major Branfill, and Captain Heaviside, respectively claiming notice for their general as well as scientific interest.

Cartography.

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Johnston's Cabinet Atlas.*

THIS is evidently a posthumous work of the eminent geographer whose name appears on the title page, and who died in July 1871. The author has evidently planned his work with great care; the maps are neatly engraved, though occasionally too much crowded to facilitate reference; and if the information had been brought down to the present date, as would no doubt have been the case had the work been published under the personal superintendence of its originator, we should probably be able to record a success equal to that achieved by many other well-known works by the same author.

Our geographical knowledge increases from day to day, and the cartographer is bound to be constantly on the watch, so that no important discovery achieved by our explorers may remain unrecorded, and that the maps issued by him may represent, as near as possible, the extent of our knowledge at the date of publication.

The very first map in this Atlas, designed to illustrate the physical and commercial geography of the world, fails to meet this requirement. Africa, for instance, is not the almost unbroken highland which it is there represented to be, and amongst the coal-fields of the world those of Southern Russia and China, long known to us, and lately brought prominently into notice by Baron Richthofen's instructive reports, ought to have found a place.

Dr. Johnston evidently meant this to be a Political Atlas, and we are not disposed to quarrel with him for having treated the physical features rather cavalierly. On the contrary, we think it a mistake to combine too many features on so small a scale. Taking then the political boundaries as the principal test of this work, we reluctantly arrive at the conclusion that it falls far short of what we have a right to expect. Due diligence ought to have been taken to render the boundaries distinct, so as to enable the reader to trace readily the territories of the different states, provinces, and extra-European dominions. But if we turn to the map of Europe we find nothing to indicate that Malta, Gibraltar, and Heligoland are British settlements. The map of Austria takes no notice of the abolition of the frontier of the Banat, that of Russia fails to show the Government of Ufa, formed in 1865 out of a portion of Orenburg.

When we leave Europe the errors, both of omission and commission, become still more serious. The map of Asia scarcely enables us to trace the possessions of the European powers, and conveys altogether erroneous notions with reference to the extent of some of the native states. The Turkish boundary is carried right down to the gates of Aden, in spite of the protests of the British Government, and the actual facts of the case. But what the Turks gain in Western Arabia, they lose on the gulf of Persia, for Hassa, though conquered by them in 1858, is still shown as an independent country. The "rectification" of the eastern frontier of Persia remains unnoticed, and the countries on the Upper Oxus are withheld from Afghanistan, which is actually in possession of them. The eastern shore of the Caspian, where the Russians have their important station Krasnovodsk, is included in the independent Turkman country, which is all the more strange as the recent annexation of a portion of Khiva has been recorded.

The maps of Africa are, perhaps, the least satisfactory of the series. The person charged with the revision

* The Cabinet Atlas of the actual Geography of the World, constructed by A. Keith Johnston. 34 maps. London and Edinburgh, 1874. 21s.

of them, with a view to their publication, appears to be in a most deplorable state of bewilderment with respect to the Nile sources. There are "sources of the Nile" in latitude 10° S. and longitude 35° E., but in tracing the rivers rising in that neighbourhood we are either landed in the Tanganyika (which has no connection with the Nile) or carried down the Congo to the Atlantic Ocean. Piaggia's "great lake," though reduced by Schweinfurth to the dimensions of a little pond, still retains its pristine importance on the map. The political colouring, too, leaves much to be desired. Why, for instance, should Tripoli and Fezzan, which are subject to the same ruler, be tinted in different colours? Why has not Barka been separated from Tripoli, seeing that it is an independent province since 1869? and why, above all, are we kept in the dark respecting the present extent of the Egyptian dominions? Surely the military posts established by Sir Samuel Baker on the Upper Nile might have found a place on a map of this kind; and there ought, we think, to have been some indication of Berbera, opposite Aden, being held now by Egypt.

We might easily have pointed out a number of other errors, if we had been so disposed, but we forbear. We have already said that the plan of the work is good, and if carefully revised by a competent person the Atlas might yet be converted into a very useful work. In its present condition it is, in many respects, altogether untrustworthy.

The same series of maps, with the exception of the physical and commercial map of the world, has been brought out by the publishers as an "Educational Atlas of Modern Geography." * This edition likewise labours under the defects noticed above, and, as a matter of course, lacks that clearness and simplicity which are essential in a work intended for school use.

Case's Map of the United States.†

THIS certainly is the finest map of the United States hitherto brought out by an American publisher. Our readers, however, must take this remark *cum grano salis*, for we do not by any means desire to convey the impression that the map before us is a superior specimen of cartography. A work of this kind takes a considerable time to engrave, and we do not, therefore, expect to find embodied in it the results of the very latest explorations. Still, we believe the draughtsman might have improved more largely upon Petermann's and Bartholomew's maps, brought out some years ago. As far as the territory of the States is concerned, however, the map is fairly correct, and though far inferior to Petermann's as regards the delineation of the physical features and as a work of art, it possesses the advantage of showing the county boundaries. The whole of Mexico (with the exception of the peninsula of California) has been copied from Kiepert's map of Tropical America. This map was brought out in 1858, and none of the important publications issued since then have been consulted. This certainly is inexcusable. The railway to Mexico is the only addition made to Kiepert's map (the omissions are too numerous to mention), and even that has been inserted incorrectly, though information on that point, we should say, could have been procured easily. The delineation of the ground (by Messrs. Wurster and Randegger, of Winterthur) leaves much to be desired. The engraver, led away by the success attained by the Swiss Federal map, has thought proper to introduce an oblique light, which is by no means

suited to a map of this kind. The vertical light, as introduced by Lehmann, is certainly that best adapted to topographical drawing. Its advantages may be clearly perceived by comparing the map before us with that of Petermann, for whilst in the latter due prominence is given to the Pacific slope of the great plateau, the former reverses the case, and shows a boldly shaded interior slope. We are by no means of opinion that Lehmann's system is incapable of further improvement, but would merely warn cartographers against an indiscriminate introduction of oblique light, on the assumption of its being more natural. There are cases when it may be employed most successfully, but as a rule the vertical light offers most advantages and is, after all, as natural as the other, particularly when it is a question of delineating countries under the equator or on our northern hemisphere.

Case's map has been neatly engraved and printed in colours, by Messrs. W. and K. Johnston, of Edinburgh.

French War Office Map of Mexico.*

SINCE the days of Alexander, military expeditions have largely contributed to an extension of our geographical knowledge. The French expedition to Mexico in 1861-67 is no exception to the rule. Each column of troops was accompanied with an officer specially charged with the survey of the route and the collection of topographical information, and in this manner routes having a total length of 17,500 miles, and extending into nearly every state, were surveyed. The valuable materials thus collected were subsequently laid down on a uniform scale of 1 : 500,000, and it was proposed to embody them in a general map of the whole of Mexico on half that scale. The latter, though commenced, has not been completed, and we are forced to rest content for the present with a map on a scale of 1 : 3,000,000, compiled by Captain Niox of the French Staff. The compiler has done his work well, and it may fairly be described as the most correct and trustworthy map of the country which we at present possess. The hills, printed in brown, are one of its most satisfactory features, and convey a clear notion of the orography of Mexico. We trust the French Government may be induced to publish the original *croquis* of its staff officers, if not a map of the entire country on a larger scale (say by photo-lithography), for otherwise much information laboriously collected will be lost to science for evermore.

Basch's Atlas of New South Wales.†

THIS atlas, we are told, is the first ever produced in the colony; for this reason, and in order not to discourage the spirit of enterprise of Colonial publishers, we feel bound to deal tenderly with it. It contains a road map of the Colony, and separate maps of the nineteen settled counties. The latter show the positions of the principal post towns, with their populations and distances from Sydney, as well as the villages, roads, railways, and telegraph lines. They indicate likewise the mines and quarries, distinguishing between gold, silver, copper, lead, quicksilver, iron, coal, manganese, marble, slate, kerosine shale, and diamonds, vine districts, &c., whilst copious marginal notes form a sort of gazetteer of the entire colony. The maps are by no means perfect specimens of cartography, but they have evidently been prepared with great care, and cannot fail to be exceedingly useful to all who are interested in the present position of New South Wales.

E. G. RAVENSTEIN.

* The Edinburgh Educational Atlas of Modern Geography. 33 maps. London and Edinburgh, 1874. 10s.

† Case's map of the United States, with the British possessions, Mexico, and part of the West Indies. Scale 1 : 3,000,000. 9 sheets. Hartford, Con. (Edinburgh, Johnston), 1874. Price £3 10s.

* Carte du Mexique, dressée au Dépôt de la Guerre, par M. Niox, Capitaine d'Etat Major. Scale 1 : 3,000,000. 2 sheets, with notes. Paris, 1874 (London, Trübner).

† Basch's Atlas of the settled countries of New South Wales. 20 maps. Sydney, 1873 (London, Trübner and Co.).

New Maps.

Karte des telegraphischen Weltverkehrs. (Telegraph Map of the World, published by the International Telegraph Office at Bern.) 4 sheets. Bern, 1874. 4s. 6d.

Map of the Countries around the Arctic Pole, with the Isothermal Lines for January, July, and the whole year. By H. Kiepert and H. W. Dove. Berlin, 1874. 1s.

Reymann's Topographical Map of Central Europe. Sheet 128 (Leipzig). Glogau, 1874. 1s. 6d.

FRANCE.

Carte physique, politique, et administrative de la France. (General Map of France, showing the railways, &c.) Drawn by A. Vuillemin, under the supervision of L. Bonnefont. Paris, 1874.

Carte des chemins de fer de France. (Railway Map of France.) By Erhard after Bonnefont. Paris, 1874.

Carte du département de la Gironde. (Map of the Gironde showing boundaries, towns, vineyards, &c. Revised in 1873 by E. Pagnan.) Paris, 1874.

Specimen de la Carte du département des Vosges. Par Erhard Scale 1 : 80,000. Paris, 1874.

Carte administrative du dép. de l'Aube. Scale 1 : 40,000. 18 sheets. Paris, 1874.

Carte du dép. de la Dordogne. Bergerac, 1874.

Alpes maritimes. Par A. Vuillemin. Paris, 1874.

Carte hydrologique du dép. de Seine-et-Marne. Par Delesse. 2 sheets. Paris, 1874.

Jacquot (E.) et Raulin (V.) Carte géologique et agronomique du département des Landes. Paris, 1874.

Méa. Atlas topographique agricole et géologique du département de la Corrèze. Paris, 1874.

Carte géologique de l'arrondissement de Segré (Maine-et-Loire). Par M. Danton. Paris, 1874.

Carte orographique, stratigraphique et géognostique d'un fragment de la chaîne de Lomont entre Besançon et Beaum-les-Dames. Par A. W. Parandier. Paris, 1874.

L'Auvergne à l'époque antéhistorique. Clermont-Ferrand, 1874.

Atlas national. Plan de Bordeaux. Par R. Barbot. Paris, 1874.

Ville des Sables-d'Olonne. Nantes, 1874.

GERMAN EMPIRE.

Messtischblätter (Plane table sections) vom Preussischen Staate. Surveyed by the Prussian General Staff, published by the Board of Trade. Scale 1 : 25,000. Sheets 231-234, 248-250, 266-269, 280-288. Berlin, 1874. 1s. each.

Generalstabkarte von Preussen (Staff Map of Prussia) 1 : 100,000. Sheets 168 (Berlin), and 299 F. (Kraftsolms), 287 D. (Altenkirchen). Berlin, 1874. 1s. each.

Becker (F.) Höhenschichtenkarte des Grossherzogthums Hessen (Contoured map of grand-ducal Hesse) 1 : 250,000. Darmstadt, 1874. 6s.

Spezialkarte der Umgegend von Schwerin (map of the environs of Schwerin, prepared in the Mecklenburg Survey Office). 1 : 25,000. 4 sheets. Schwerin, 1874. 6s.

Neumann (P.) Plan der Umgegend von Breslau (environs of Breslau) 1 : 25,000. 4 sheets. Breslau, 1874. 3s. 6d.

Neuester Plan der Stadt Augsburg (Plan of Augsburg). Augsburg (Rieger), 1874. 1s. 3d.

AUSTRIA.

Kozenn (B.) Oro-hydrographical Atlas of the Austro-Hungarian Monarchy. 12 sheets. Vienna, 1874. 1s. 8d.

NETHERLANDS.

Abel (F. E. L. A.) Kaart van het koninkrijk der Nederlanden (Map of the Netherlands, showing the system of fortifications, and published by the Country Defence Association. Scale 1 : 200,000. 6 sheets. Utrecht, 1874. 16s. 6d.

Sloten (P. K. S. J. von). Topografische kaart der gemeente Arnhem (Arnhem and environs) 1 : 10,000. 4 sheets. Arnhem, 1874. 8s.

Ribeiro (Duarte da Ponte). Carta do imperio do Brazil, reduzida no arquivo militar, em conformidade da publicado pelo Coronel C. J. de Niemeyer em 1846, e das especies das fronteiras com os estados limitrophes organizados ultimamente. Rio de Janeiro, 1873. 1s. 3d.

Log Book.

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The Arctic Manual.—Nearly the whole of the portion undertaken by the Geographical Society is now passing through the press. The geographical section consists of papers by Dr. Robert Brown on the physics of Arctic ice, on the formation of fiords, and on the Greenland glaciers; papers by Baron Wrangell and Dr. Rink on Smith Sound; a paper by Admiral Irninger on Arctic currents; and a most valuable contribution by Admiral Collinson on the ice along the coast of North America. The ethnological section comprises a complete list of all places on the east and west coast of Greenland, with Eskimo names and meanings, Norman ancient names, Danish names, names on the Admiralty chart, and latitudes, and remarks; papers on the migrations of the Greenland Eskimos and on the Arctic Highlanders, with a sketch of the Eskimo grammar and classified vocabularies; a paper on the descent of the Eskimo by Dr. Rink; a report on the Tuski and Western Eskimo by Dr. Simpson; a list of names of places of the Western Eskimo, by Admiral Collinson; and the report of the Anthropological Institute on the anthropological results to be obtained by an Arctic Expedition; with a series of questions by Colonel Lane Fox, Mr. Tylor, Mr. Boyd Dawkins, and others.

The Naturalists of the Arctic Expedition.

—Captain Fielden, the naturalist who has been appointed to the 'Alert,' has arrived in England from Malta, where he has been serving for the last eighteen months. He has a thorough acquaintance with the science of ornithology, and has made the birds of the Farøe Islands his special study. The medical officers of the 'Alert' are also well qualified as naturalists. Dr. Colan is an officer of high scientific attainments, and Dr. Moss is a good botanist and also an excellent artist.

Mr. Henry Chichester Hart, the botanist appointed to the 'Discovery,' has published an enumeration of the flowering plants and ferns in the Arran Islands, Galway Bay; in which he adds about twenty-five indigenous species to those previously known. Mr. Hart is a son of Dr. Hart, one of the Senior Fellows of Trinity College, Dublin.

Photographs of the Austro-Hungarian Arctic Expedition.—Mr. Bruckmann (28, Henrietta Street, Covent Garden,) is about to publish a series of twelve photographs illustrating the voyage of the 'Tegethoff,' and Lieutenant Payer's adventurous sledge journeys. The photographs are from paintings taken from Payer's admirable water-colour sketches, and they convey a most excellent idea of the wild scenes visited by the explorers. They, indeed, form a complete history of this memorable voyage, from the parting of the 'Tegethoff' and 'Isbjorn' off Novaya Zemlya to the rescue of the retreating party by the Russian schooner.

Commodore Goodenough.—We are glad to be able to announce that the services of this distinguished officer, whose valuable report on the Fiji Islands was noticed in our last number, have been recognized by the grant to him of a Captain's good-service pension. His father, the Dean of Wells, was on the first Council

of the Royal Geographical Society, and contributed an interesting memoir on the Black Sea to the first volume of the Society's Journal. Commodore Goodenough himself became a Fellow of the Society in 1863, and during the course of his active service in many parts of the globe, he has ever taken a lively interest in the advancement of the Society's objects. Four of the officers who have been selected to serve in the Arctic Expedition received their best training under Captain Goodenough in the 'Victoria' and 'Minotaur'; and much good surveying work has been done under his auspices by the officers of the 'Pearl.' The period of his command on the Australian Station will be one in which no opportunity will be lost to advance geographical knowledge and to complete useful surveys.

Indian Marine Surveys.—Various circumstances have served to delay the commencement of these operations. Writing under date 10th February, Captain Taylor says—"It is now arranged that the 'Clyde' steamer, under Commander Ellis, R.N., will examine some of the Laccadive Islands, and then proceed to Tuticorin and the Paumben Pass, where she ought to arrive about the 1st of March. She will then make arrangements for the 'Constance' to be towed through the channel into Palk Strait; after a few days' sounding there, the 'Clyde' will prosecute her journey, calling at Madras, or Koringa, and being due at Calcutta on the 21st of March. The first duty of the 'Constance,' under Commander Chapman, late I.N., is a survey of Kolachul Port on the Travancore coast, a duty which will occupy her till the middle of March. Then she is to go through the Paumben Channel, and be engaged upon the survey of Palk Strait, and, perhaps, the shoal of Moelitivó, on the Ceylon shore, till the middle of May, when the Madras cyclonic period is past. After witnessing the first burst of the south-west monsoon at Paumben she will proceed to Coconada to remain there till the end of August, and carry out a fresh survey of the bay.

New Chart of the Makrán Coast.—The new chart of the Makrán Coast, the seaboard of Baluchistan, hitherto little known, but which has lately assumed importance, owing to the establishment of telegraphs along it, and to the Persian boundary question, has been completed by Lieutenant A. W. Stiffe, of the late Indian Navy, who has been employed on this work for some time by the India Office. It has been published by the Admiralty, and is now available for the use of the public. It is a neatly engraved sheet, and will, doubtless, meet all the requirements of the navigator. A small book of detailed sailing directions for the coast, to accompany the chart, has been written by the same officer, and is now passing through the press, also under the supervision of the Hydrographer. It will be valuable to all seamen who have occasion to touch on or pass near these shores. In addition, a new edition of the Admiralty Persian Gulf Charts and 'Pilot' has been prepared in which the orthography of the names has been revised according to a system approved by the India Office as well as by the Admiralty.

News from Eastern Turkistan.—The last number of the Russian official paper of Tashkend brings some interesting news from the dominions of Amir Yakub Khan. First we must note the rather curious version the Russians get concerning the embassy of Sir

Douglas Forsyth. Out of the 300 (!) members who accompanied that embassy, we are informed 150 returned to India, and the other 150 remain in Kashgar and Yarkand, in order to assist that warlike prince in manufacturing arms—of course, against Russia. There had arrived, besides, a caravan of 300 horses, laden with valuable goods, the owners of which, however, declined selling anything, as they expected another caravan that remained behind. The Tartar merchants who went to Yarkand were told by the English that they intended to make the first offer to the Amir, and then to sell the rest to officials and traders.

In reference to political news, we hear that the people, as well as the soldiers, begin to be dissatisfied with the Amir's rule. He puts his greatest confidence in the Tungans, with which nation he entered into nearer relations by marrying several of its daughters. It is the want of confidence in his army which inspires him with respect towards the Russians. He fears their approach very much, and it was for his personal safety that he erected and fortified two Tashkurgans (stone forts), one near Kashgar and the other near Khotan.

Of much greater importance are the accounts coming to us through Russian scouts from Western China, about the Tungans, and the movements and operations of Yakub Khan in those regions. The Russian authorities at Kuldja received the following news by a Tungan named Yauwan Kho, who towards the end of last year had made his escape to Russian territory. The Tungans, under the sway of the ruler of Kashgar, are governed by some of their own countrymen. In Manassi and Urumtsi perfect peace prevailed at the end of last year, and all communication with the Chinese was totally cut off. The entire population in these parts is said to be in a pitiful condition, owing to the exorbitant extortions of the Kashgar army.

Turfan is in the hands of a superior officer of Sart origin, named Törüma, and contains a garrison of 500 Kashgar soldiers. A similar number is stationed at Tokhtasun, while the pass in the Dabin Mountains between Urumtsi and Turfan is guarded by 200 men. During the last year about 6000 Tungans arrived from Komul in the last-named towns, and a part undertook foraging excursions against the nomadic Kalmüks in the north, returning with a considerable booty in cattle, for which act, however, they were absolved by Yakub Beg, on payment of a sum of money. Similar expeditions were also undertaken against the Chinese troops at Suzanza and Shi-kho. There is nothing like a regular army among the Tungans, and their weapons are of the most primitive description, consisting mainly of cudgels, spears, a few matchlocks, and a little gunpowder brought from Komul. The situation of the Tungans is, on the whole, by no means an enviable one, if we only consider the heavy taxation imposed upon them by Amir Yakub Khan. These they are compelled to pay in silver at the beginning of the year. It is also reported that many of them—to escape from the constantly threatening Chinese—intend to emigrate, some to Kashgar, and some to Kuldja.

Concerning the Chinese-Russian border territory, and particularly the strategically important Shi-kho, the latest accounts are of an exceedingly sad nature, on account of the universal poverty there prevailing.

Around Shi-kho there are six fortresses ; of these two are guarded by 500 Chinamen, and by 500 other troops, partly from Kuldja, partly from its environs, most of them being refugees. The garrison of two others of these fortresses consists of 1000 men, partly Manchus, partly Mongols ; while the last two are occupied by Kalmüks. The chief command is in the hands of Shu-Amban, a Manchu, and Su-Amban, a Kalmük. The regular army usually lies in Shi-kho, and is occupied in watching the border. It is reported that a concentration, on a larger scale, of the regular army, commanded by two officers—Shushu-gun and Djinditun—is going to take place at Suzanza. Otherwise the Chinese keep strictly on the defensive. In regard to their future plans of campaign, it is stated that those stationed at Barkul and Kamul will soon be set in motion towards Kashgar, while others are preparing to march against the Tungans of Urumtsi and Manassi. The Chinese seem to be willing to extend their propaganda even among the Buddhist Kalmüks, subject to Russia ; if so, they are labouring under a grave mistake, for wherever the Russian bear has planted his paw, there the Chinese dragon will never find a foothold.

A. VÁMBÉRY.

Captain Trotter on the Drainage of the Pamir.—Captain Trotter's geographical memoir, prepared to accompany Sir Douglas Forsyth's report on the recent Kashgar mission, is now passing through the press. In his journey over the Little Pamir he ascertained that the lake on this table-land, called Barkut Yassin by the Mirza, is one of the sources of a river which is called here the Aksú, and afterwards the Murghábi, and which joins the Oxus near Wámar, and is in all probability the principal source of that river, as has already been conjectured by Colonel Yule. The furthest point reached by Captain Trotter to the west is Kila Panja ; but fortunately he was able to send one of his native surveyors down the Panja River for a considerable distance. The man first went to Ishkashim, so far travelling along a route which is well known from the journals of Wood and the Mirza, and then struck northwards into a region that was altogether unknown, and followed the downward course of the Panja River for a distance of nearly 100 miles, finding its direction to be in reality very different from what has hitherto been conjectured and represented on the best maps of these regions. He reached Kila Wámar, in Roshán, but was unable to go down the river any further. An exploration has, however, been since made from Fyzabad and Koláb up the river, to a point which is believed to be at no great distance from Kila Wámar, by Colonel Montgomerie's Havildar, who is now returning from Kabul with his journals. He writes that he has suffered great hardships, and lost some of his papers ; but if enough evidence is forthcoming to determine the course of the Oxus from Kila Wámar down to the plains of Koláb, a problem which is of the highest importance both politically and geographically will be solved.

Captain Burton on the Outlet to Tanganyika.—In his interesting geographical notes, published in the *Pall Mall Gazette* on March 25th, Captain Burton, speaking of Lieutenant Cameron's discoveries, says—"The gallant young explorer has so thoroughly surveyed and fixed not only the details, but the trend and shape of that great reservoir, that he amply

deserves to be entitled SECOND DISCOVERER OF THE TANGANYIKA." Captain Burton at present inclines to the opinion that the Lukuga outlet is a surplus drain, acting mainly during the period of inundation, and becoming an influent during the dry season.

Darien.—The cessation of the pearl fishing has made it a matter of great importance to the State of Panama, with reference to the continuance of commercial prosperity, that some other product of equal value, and for which there is a constant demand, should be discovered on the isthmus. Hence the extraction and export of *caucho* (India-rubber) is receiving much attention. The trees are found in great abundance in the territories of the Darien Indians, but these independent tribes are inclined to obstruct the work of the *caucheros* or India-rubber collectors, and to resist an entrance into their forests. The New Granada Congress has authorized the Government to station a force of national troops in Darien, to protect the *caucho* industry, but they have not yet arrived. Meanwhile the merchants engaged in the trade have sent about 300 labourers up the Darien River in boats, to a place on the Chucunaque, where they will be stationed, and whence they will occupy and work certain localities as far up as the river Chucurti, an affluent of the Chucunaque. The *caucho* trees (belonging to the genus *Castilloa*) are said to abound in dense groups in the forests drained by the head waters of the Chucunaque and Chucurti ; and so long as the tapping of the trees is done on an intelligent principle, and under due superintendence, the supply will be inexhaustible.

Correspondence.

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THE ETYMOLOGY OF "TURKMAN."

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—There seems to be an almost common consent among the authors of our standard books upon the history of Central Asia in regard to the etymology of the name Turcoman or Turkman, and yet I believe it to be ill-founded and even to have confused our knowledge of the ethnography of Central Asia very much.

The etymology generally followed is the one given by Raschid-ud din, the court historiographer of the great Ilkhan of Persia, Gazan Khan, and also by Mirkhond. They tell us that the name is not an old name, and that before the Turks came in contact with the Persians, and while they yet wandered in their own steppes, they were known simply as Turks, each tribe having its own specific name, but Turk being the generic title of all. When they began to cross the Jaxartes into Mavera ul nehr and Persia, and began to have children there, these acquired the look and appearance of the indigenous Tajiks. The latter thereupon gave their new neighbours the name of Turkmán *i.e.*, "Resembling Turks" (see Erdmann's *Temudschin der Unerschutterliche*, page 42, note 1). This etymology, which has a very eastern look, will not bear much criticism. If Turkman had not been the indigenous name used by the Turcomans themselves, but a name merely applied to them by the Persians, it might have been reasonable, but that a very important and numerous race, consisting of many tribes, should adopt such an extraordinary name as "Resembling Turks" is incredible. To the Turkmans their Turkish descent and Turkish idiosyncrasies are matters of immense pride, and this being so, that they should proclaim themselves a bastard and a mongrel race, and adopt a name which would compromise the purity of their descent, is quite

monstrous to those who have studied Turkish habits of thought in such matters. Nor can we conceive, even among more servile races, how a whole nation which had formerly styled itself Turk, should, in consequence of such very small changes as separate the Turcomans from the Kazaks and other Turks of the proper Turkland, entirely alter its name, and alter it in such a weak fashion. Klapproth, who, notwithstanding some errors (and who among us is so free from them), had a wonderful instinct in these matters so long ago as 1823, suggested a doubt as to whether the received Persian etymology was a sound one, and expressed himself as unable to receive it, inasmuch as the Turcomans who still live on the Jaxartes, and who are unmixed with Tajiks, also use the name (Asia Polyglotta, 217).

Fortunately another etymology is available, and one which has not the same defects. Neshri, the native historian of the Turks—one well versed in the Turkish language, and not likely to have been led astray by etymological fables that would commend themselves to the lively imagination of the Persians—tells us that Turkman is compounded of *Turk* and *Iman*, that is, believer (see Von Hammer's *Geschichte des Osmannischen Reiches*, i., 37, note 3, and Ali Suavi's *Memoir on Khiva*, 31). This etymology is not only probable, but almost certain, and the account Von Hammer gives of its origin is very satisfactory. He tells us that the first body of the Oghuz Turks who became Mussulmans was a section of 2000 under the command of Salur, a descendant of Tak Khan, and that this was in 960. He was afterwards called Chanak or Kara Khan, while his people, to distinguish them from the unbelieving Turks, were styled Turkmans" (Von Hammer, *op. cit.* i., 37). We know what a magical effect the introduction of the faith had upon all the Turkish tribes. What an immediate change there was in their nomenclature, and in many of their habits, and what fanatical disciples they became. We can hardly realize what a barrier the possession of the faith created between the proud convert and the equally proud unbeliever; we have only to read the correspondence of the great Khan of the Golden Horde, Uzbek Khan, with the Mameluke Sultan of Egypt, to guess what fierce fanaticism it introduced into the steppes of Turkistan, and how very proud he and his people were of being within the pale. We are not surprised, therefore, that the converted Turks should have changed their name, and qualified it by such a proud adjective as believer, just as the Kumuks after their conversion were styled Kazi-Kumuks in opposition to Kafir-Kumuk applied to their unconverted brethren. The name Turkman, therefore, is of small ethnic value, it does not enable us to discriminate tribes of various origins. It included, properly, believing Turks of whatever origin, and only became limited to the Turks of Khorassan and its border when other believing Turks acquired specific names. It was a generic name including all Mussulman Turks. This being so, it is interesting to inquire what generic name was applied to those Turks who were still unconverted. The most usual name so employed was, I believe, Oghuz. An Oghuz Turk did not always mean a Turk of some particular tribe named Oghuz, but was apparently used indiscriminately for all the nomadic Turks. The Comans were so called; the ancestors of the Osmanli and Seljuki were so called; and the name is used generically by Abulghazi, who tells us they were divided into several sections, as the Kiptchaks, the Kankalis, the Karluks, &c., &c. All these, he tells us, were subdivisions of the Oghuz. Oghuz, then, may be properly used as the correlative of Turkman; the latter meant the believing and settled Turk, the former his unbelieving and nomadic brother. If this conclusion be kept constantly in view, it will assuredly clear up very considerably the history of the early Turkish invaders. With your permission I should like to say something more about the Oghuz Turks in another letter.—Yours, &c

HENRY H. HOWORTH.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of February 22nd 1875.

DISCOVERIES IN EASTERN NEW GUINEA BY CAPTAIN MORESBY AND THE OFFICERS OF H.M.S. 'BASILISK.'

THE President, Sir HENRY RAWLINSON, took the chair at 8.30 P.M. In introducing Captain Moresby, the author of the paper about to be read on New Guinea, Sir Henry informed the meeting that at the commencement of the previous session an interesting letter from the same author had been read, giving a very graphic account of certain discoveries which he had made in New Guinea. He was now present, and would give them an account of a more recent visit to that island, during which he had accumulated a large amount of information, political, ethnographical, commercial, and geographical. Up to the present time, whenever he (the President) had been taunted with the probable exhaustion of the work of the Society, he had always been able to fall back upon New Guinea as an unknown land, which would afford material for many years to come. He was really now afraid that that stronghold of the unknown was fading from their grasp, for not only British officers, but Italian and Russian travellers, were invading that *terra incognita* on various sides. Still, he was very happy to find that the lion's share had fallen to the lot of England, and that, as far as such appropriation was of any national importance, Captain Moresby had appropriated all the south-eastern, and apparently the most valuable portion of the island.

After a few preliminary remarks, Captain MORESBY said he felt somewhat amazed to think that the very outline of the third largest island in the world should have been unknown till now, and the navigation between its north-east coast and Australia invested with such imaginary dangers as to prevent communication between these shores.

East New Guinea ends not in a wedge, as hitherto imagined, but in a huge fork, the lower prong of which is cut up into an archipelago of islands. Between these new islands and the peninsula which forms the northern prong a sheet of water lies, about 45 miles long and 12 to 18 in breadth, named by Captain Moresby Sir Alexander Milne Bay.

This new archipelago consists of about sixty islands, large and small, the largest of which, Moresby Island, is about 36 miles in circumference; Basilisk Island nearly as large; Hayter and Heath Islands somewhat smaller; many of the remainder being from 4 to 12 miles in circumference, and inhabited. These islands are mostly lofty and volcanic, and richly wooded.

Moresby Island, a fair type of the rest, rises boldly from the sea to a height of 1600 feet, rich in fruit-bearing and timber trees, whose dark tropic green is relieved by the various earth-tints of the cultivated and terraced land, and the lighter greens of yam and taro. Here and there the eye rests on great grassy slopes that look like English meadows ready for the scythe; but a giant scythe indeed would be needed to cut them, for this grass is 12 feet high. On the shore are scattered the most singular dome-shaped grassy hillocks, which made for us natural surveying stations. On the water-line the shore is broken into fine deep-water bays, some five of which are good harbours. Villages cluster to the edge of the calm waters, and here and there a coral reef runs out, from which the dusky fishers ply their task.

The 'Basilisk' has had the honour of fixing the position and laying down the coast-line of the D'Entrecasteaux group, which was seen from a distance by D'Entrecasteaux ninety-four years ago, as he sailed in

search of La Perouse; but he never visited the islands, and saw them on the east side only.

We have proved them to consist principally of three large islands, separated by narrow straits from each other and the mainland of New Guinea; and as their first surveyor and visitor, I have taken leave to name the islands Normanby, Fergusson, and Goodenough, and the straits Ward Hunt, Goschen, Dawson, and Moresby. These islands extend north and south about 90 miles, and afford harbours and anchorages.

Captain MORESBY then gave a brief account of this survey. Accompanied by Lieutenant Mourilyan, an engineer, and seven men, they started on March the 7th in a steam-pinnace, with a whale-boat in tow, loaded with fuel and provisions for a week. Leaving the ship in Dawson's Straits, and steaming to the westward, they passed close under the high volcanic mountains of Fergusson Island, which bound the strait to the north. Turning the western point of Fergusson Island, they found themselves at the entrance of a fine strait separating Fergusson from Goodenough Island. Both these islands, with their forests topped by bare grey peaks, are grandly picturesque objects, Mount Goodenough rising magnificently to a height of nearly 8000 feet. The sides are cultivated in patches to a height of about 2000 feet; gradually its woods give place to barrenness, and its summits stand bare and knife-edged against the sky. Mountain torrents dash down its ravines and flash out at times from their dark-green setting like molten silver.

They were compelled, owing to the number of pillars of mushroom coral, which bristled in every direction within a few inches of the surface, to seek anchorage in 20 fathoms of water outside these coral pillars, on which a dangerous surf was breaking.

Next day, through want of fuel, they failed to completely circumnavigate Goodenough Island, which was found to be the home of the megapode and a variety of exquisitely-plumaged birds; also of parrots and lorries.

On landing at a large village in Moresby Straits, the married women alone advanced to meet the English, the men appearing, but keeping back in evident timidity; but the presents distributed amongst the women soon brought the men about them, all anxious to exchange their stone axes for rusty iron hoop. So entire was Captain Moresby's confidence in the peaceful disposition of these people that, accompanied only by a seaman, he visited their inland plantations, and found large enclosures, well fenced in with bamboo, producing tropical fruits, yams, sweet potatoes, Indian corn, and sugar-cane. The sago-palm grows most abundantly here, and the natives mash the sago in immense troughs, which at first he took to be worn-out canoes.

The great Louisiade reefs, hitherto deemed an impenetrable barrier between Australia and North-east New Guinea, present, in reality, a wide open gateway, through which ships may safely pass from Australia to North-east New Guinea, and enter on a shorter course to China. Previous to this discovery three routes lay open between Australia and China. Of these, the shortest, or New Ireland passage, ran inside the Solomon Islands, and leaving the Louisiade Archipelago to the west, went between New Britain and New Ireland, and so on to China. The new route lies to the west, instead of the east of the Louisiade reefs, and shortens the distance by about 300 miles, without increasing the danger. Eventually the trade with China will be carried on by steamers, and this, the shortest route, will doubtless be the route. Near Teste Island the Louisiade reefs sink from the surface to a depth of 10 or 12 fathoms, and so continue for more than 100 miles to the west.

To the immediate west of Teste Island ships bound by this new route pass over this sunken barrier, and here Nature has placed such striking landmarks that a land-fall can be unmistakably made. Teste Island is easily recognisable. Its peaks rise to a height of 300

feet, and look like islands at a distance. Four miles to its west stands Bell Rock, a great dome-shaped mass of rock, rising perpendicularly from the sea to a height of 500 feet, wooded over wherever a crevice affords room for a tree to grow, and marking well the entrance to the new route; it may be passed by a vessel within a stone's throw. Thence, as the ship passes between Moresby Island and Engineer's Group, not a reef lies in the way. To the north-west of Slade Island the passage lies between two reefs about 2 miles apart, and a passage of 4 miles breadth leads to the point of exit between Cape Ventenat and a reef, which Captain Moresby named Gallows Reef. The channel here is 2 miles wide, and Gallows Reef being a wash, and marked by two tree-covered islets, affords sailing-marks which remove all danger to the navigator.

Another useful gift which the 'Basilisk' has been able to present to the mariner and the merchant is the discovery of harbours on these once inhospitable coasts, to a few of which Captain Moresby briefly referred.

Robert Hall Sound, South New Guinea, in latitude 9° N., longitude 146° 3' E., is well marked by Yule Island at its entrance. He had a great belief in the future of this noble sheet of water, seen from seaward by Captain Owen Stanley's survey, but never entered till now, by a passage found off the south-east end of Yule Island. A good, safe, clear channel leads in, and the harbour is perfectly protected, and land-locked with deep water, for hundreds of ships to lie safely. Its shores are low, swampy, and mangrove-covered, and probably unhealthy; but Yule Island, near which ships would anchor, is high and healthy ground. At the head of the harbour Hilda River issues, navigable for steam-launches, but too rapid for row-boats to ascend, destined in time to bear the valuable woods and many produces which here await the advent of commerce downwards on its rapid bosom.

Port Moresby is a safe, commodious, double haven, lying 60 miles to the east of Robert Hall Sound, at the point where the swampy coast first gives place to coral white sand and shells. This harbour was discovered, after much search in open boats, from Jane Island. Great anxiety then arose as to whether a good entrance could be found; and for two days more soundings were made far away from the ship, inside the great barrier reef. Suddenly the lead dropped 50 fathoms down, and finding no bottom the entrance was found. Two days after the ship was taken in. The outer harbour of Port Moresby is an extensive bay, surrounded by open, grassy, round-topped hills, thinly timbered with the Australian gum-tree, whilst rich tropical valleys lie between. There are several large native villages on its shores. Jane Islet, about 500 feet high, lofty and precipitous, wooded and cultivated, stands in the centre of the outer harbour, and if fortified would render it impregnable. The eastern waters are a mass of coral reefs, but the western are clear, and just the right depth—9 to 12 fathoms—for anchoring. A fine, clear passage leads to the inner Fairfax Harbour, and in this inner broad sheet of water, shut round by high land, the 'Basilisk' anchored in 5 fathoms. On its southern side from the hill under which she lay, a considerable quantity of gold quartz was taken. This port, from its healthy situation, has already been selected as the principal station of the London Missionary Society.

Pitt Bay is a fine harbour, and easily entered; it lies at the gateway of the new Austro-Chinese route at the east end of Moresby Island, embosomed by lofty hills. Hereafter, the power holding Pitt Bay will possess the key of the route. At Pitt Bay a piece of gold-bearing quartz was taken from the bed of a stream, but though diligent search was made, no more could be found.

Traitors' Bay, on the north coast of North-East New Guinea, in latitude 8° N., and longitude 148° E., offers shelter to ships trading on that coast, and possesses a navigable river with a gentle current. This river dis-

charges itself outside the anchorage, over a bar that proved impracticable to boats. Captain Moresby regretted he had not time to survey this river, for it seemed to him to lead up far into the country, and he hoped some future explorer would follow it up.

He then gave an account of their last work, which was the running survey of the unknown coast of North-East New Guinea.

On April 27th, the 'Basilisk's' head was turned westward, every mile now being a step towards home.

The first striking difference between these northern and the southern shores of New Guinea is that here there is no outlying barrier reef, and the shores, instead of shelving outwards, are steep too. The mountains generally run down to the sea, then follows a shore reef, from which the plumb-line may be thrown into 50 fathoms of water.

The coast-line is but little broken up, and affords few harbours and anchorages. Speaking generally, from East Cape to Cape Cretin, the coast-line may be spoken of as a series of bold headlands, running out 20 to 30 miles to seaward, with deep bays between.

The great Owen Stanley Range may be said to terminate at the head of Sir Alexander Milne Bay, but one of its spurs, named by Captain Moresby "Stirling Range," runs at a diminished elevation through the narrow peninsula, which terminates at East Cape. This henceforth important promontory on the world's map has no great feature to attract attention. The peninsula has gradually narrowed to half a mile in width. The Stirling Range has ceased, and been succeeded by a low, undulating forest country, sprinkled with villages, when suddenly an abrupt double-topped hill springs to a height of 300 feet.

Between Cape Ducie and Cape Frere the forest ceases, and is succeeded by an openly wooded level plateau, full of villages, backed, 2 miles inwards, by a range of sharp grassy hills, bare of wood, each defined by a belt of sharp brushwood at its base, crowding down hill upon hill, with such a curious effect as to remind one strongly of the plate in Black's 'Atlas' of all the mountains in the world. Above the height of 2000 feet the forest springs up again, and covers still higher peaks to the very top, to a height of 6000 or 7000 feet.

Cape Frere is a noble headland, dropping its huge buffalo-headed mass about 2000 feet almost perpendicularly to the deep blue sea; and the 'Basilisk' looked a mere cockboat in the huge shadow, as, almost scraping her sides against the beetling mass, she stood in to seek for an anchorage in Bartle Bay.

From Bartle Bay into the bight of Goodenough Bay, a distance of some 30 miles, the bold and fertile coast runs in a W.N.W. direction. There are some fine waterfalls at the head of this bay, flashing down the dark-green mountain-sides, and so much river-water is here discharged that the surface of the sea is quite fresh. The canoes about here are smaller; and quite a different language prevails from that at East Cape.

From the bottom of Goodenough Bay the land turns abruptly in an E.N.E. direction, and so runs boldly out to sea for 30 miles in a rich forest-covered promontory, which ends in grassy slopes marking Cape Moresby, off which are small outlying islands, surrounded by coral-reefs. From this point, looking across Ward Hunt Straits, we could still see Mount Goodenough rearing its stupendous mass.

From Cape Moresby the land trends W.N.W. for 45 miles to the bight of Collingwood Bay, the shores of which are low and densely wooded, and the depth of water decreased to 50 fathoms at 2 miles from the shore. From this point the natives became suspicious and unfriendly, and much difficulty was experienced in communicating with them. The land now runs north-east for 45 miles, till it forms a noble promontory, and terminates in Mounts Victory and Trafalgar, 3000 feet high, and Cape Nelson—names which Captain Moresby rejoiced to write for perhaps the last time on the map of

the world. The natives here fled at the approach of the Englishmen, and it was observed that, although belonging to the light-coloured race, they differed in appearance from the natives of East Cape, and wore their hair in long, thin, ugly ringlets.

Cape Ward Hunt lies 40 miles to the westward of Cape Nelson; the deep bay between was named "Dyke Acland," its low, wooded shores, with the formation so characteristic of this coast, suddenly turning to the north-east, and forming a bold, wooded promontory. Eight miles to the westward of Cape Ward Hunt is Traitors' Bay.

Passing Cape Ward Hunt Captain Moresby came upon the position assigned in the charts to "Ritchie Island," so named after the naturalist of D'Entrecasteaux's Expedition ninety-four years since. No trace of any such island now exists. It is probable that D'Entrecasteaux, at a great distance, saw the high land about Cape Ward Hunt, which would then appear as islands, and thus he noted it on his chart.

Huon Gulf lies between Cape Ward Hunt and Cape Cretin, and is the last of the great bays which distinctively mark the north-east coast of New Guinea. Its shores are well populated, and the natives were friendly. Its shores are covered with a rich vegetation; and especially beautiful are the slopes of the Rawlinson Range, teeming with palms and tree-ferns, and well inhabited. From Cape Cretin to Astrolabe Gulf, a distance of 120 miles, the land trends nearly due east and west, without a break; the coast-line is backed up by the great Finisterre Mountains, the two highest peaks of which, standing facing each other, were named Mounts Gladstone and Disraeli. At Astrolabe Gulf the survey terminated; but off the northern shores of New Guinea a series of deep-sea soundings were taken, finding from 1500 to 2000 fathoms 25 miles from the shore, a depth probably unequalled in any part of the world in such close proximity to the land.

The 'Basilisk' passed from Astrolabe Gulf towards Lesson Island, an active cone-shaped volcano, discharging large volumes of steam and smoke. It is densely populated, and the cultivation at its base appears very rich. The natives, a fine-looking race, crowded alongside the ship, eager to barter all they possessed for scrap-iron. Their hair is worn in a preposterous manner, confined behind in a conical case projecting 12 or 14 inches, as a horn, from the back of the head. Off Garnet Island the 'Basilisk' passed through a large body of brackish water, forcing itself seaward, and bringing with it vast numbers of gigantic uprooted trees. From this fact Captain Moresby concluded that a river of large dimensions must exist in the neighbourhood of Cape Della Torre.

On June the 2nd they reached the Dutch Spice Island of Amboyna, having thus successfully completed the survey of the last unknown coast of the habitable world.

The meteorology of Eastern New Guinea appears to be different from that previously supposed. The north-west monsoon blows from November till March, accompanied by occasional westerly gales, with fine-weather intervals. The south-east monsoon, which follows, they never found to blow continuously up to the time of their leaving the coast in May, for they experienced light variable winds and calms; whilst on the northern shores of Eastern New Guinea the south-east monsoon appears to be altogether arrested by the lofty Owen Stanley Range, the summits of which, during the month of May, were observed with heavy clouds, leading them to believe that the monsoon was blowing strongly on the southern shores of the peninsula, whilst they on its northern side were sailing in calm and waveless waters.

The barometer showed little or no fluctuation, remaining steady between 29.80" and 29.90"; the thermometer in the shade varying from 83° to 86°. The tides varied in rise and fall from 8 to 12 feet.

Captain Moresby then gave a very interesting account of the native race inhabiting the newly-dis-

covered portion of New Guinea, which he said was distinctly Malayan; but differs from the pure Malay, being smaller in stature, coarser in feature, and almost beardless. Amongst them many men were met with light hair, and a particularly Jewish cast of feature. They rise to a height of from 5 feet 4 to 5 feet 8, are sinewy though not muscular, slight, graceful, and eel-like in the pliability of their bodies. This race abuts on the black Papuan, somewhere in the vicinity of Cape Possession; but Captain Moresby did not believe that a fixed line of demarcation existed, for in Robert Hall Sound both types of race were present, and the natives varied here amongst themselves in colour, stature, and feature.

This new race appeared to inhabit the whole of the eastern peninsula of New Guinea on its northern and southern shores, and also the newly-discovered archipelago of islands adjacent, and were found to be very kindly, greeting Captain Moresby and his party with a wondering welcome.

He inclined to the belief that these people have not any religious feelings; certainly no external evidence of such was observed; nowhere were idols to be found. One action only seemed to have a religious tendency, namely, their universal custom of bringing a village dog and dashing its brains out in our presence, after which ceremony they showed perfect friendliness. They bury their dead in a respectful manner in the ground, and build small thatched huts over them, some of which are rudely carved and fenced-in with a bamboo palisade.

He considered these Malays a more civilized race than the Papuans, possessing as they do the art of pottery, still unknown to the latter. As fishers they far excel the Papuans: the latter fish only with hook and line and the barbed spear, whilst the former make fishing-nets of various sorts with great skill, and are great adepts in their use. Their weapons consist of stone tomahawks, clubs, axes, spears, heavy wooden swords, and hair slings.

Their houses and those of the Papuans do not differ materially. They are built on poles sometimes 12 or 14 feet from the ground, and consist of one large tunnel-shaped room, well thatched over. A pole, with notched steps, leads from the ground to a small landing-place or verandah, behind which is the small opening leading into the interior. They are rude but successful cultivators of the ground; their food is very plentiful, consisting of fish, yams, taro, fruits, and, on great occasions, pork; and they do not make any kind of intoxicating drink. This plenitude of food may have some influence in checking a desire for cannibalism, which does not prevail largely amongst them, though, from the fact that some were seen wearing bracelets of human jawbones, and necklaces made of the spinal vertebræ, which had evidently been subjected to the action of heat, Captain Moresby suspected that cannibalism was not wholly unknown to them.

These people are affectionate to their children, and they did not, like most savages, keep their wives in the background, but allowed them to come out freely, and have a voice in trading. The men are but slightly tattooed, but the women tattoo all over, sometimes in graceful patterns. The men paint grotesquely with ochres, and sometimes shave the head and paint it, and the whole body to match, of a shining black, with charcoal and cocoa-nut oil. The women crop their hair short, the men wear theirs long and frizzed, and all disfigure their mouths with chewing the betel-nut, except the younger women. The men wear a waist-cloth only, the women the usual South Sea garment, the short grass petticoat or "ti-ti."

In the discussion which followed the reading of this paper, Captain EVANS, R.N., Hydrographer to the Admiralty, said he did not think our present knowledge of New Guinea was sufficient to warrant the belief that it was becoming a well-known land, for, literally, nothing was yet known about its interior. He himself was engaged, some thirty years ago, for two or three seasons

in Torres Straits. At that time the Gulf of Papua was not laid down upon the charts. The coast he visited in H.M.'s surveying-ship 'Fly' was for 100 miles evidently the delta of some great river, with many fresh-water openings from 2 to 5 miles wide. The fresh water at one opening was observable 12 miles from the land. On several occasions the boats attempted to penetrate some little distance up these channels; but the natives were so numerous and hostile that it was difficult to get past them. One of the native houses was measured, and found to be 300 feet long, and 70 feet wide. Such houses were numerous, and the population must, therefore, have been great, and the country very fertile to feed such numbers. They were entirely different in character and appearance from those whom Captain Moresby had described. They were the true Papuans; black, fierce in appearance, still fiercer in manners, and all efforts to conciliate them were perfectly useless. The large body of fresh water seen by him must be the drainage of a great part of New Guinea, and there was room enough in the interior for a river 350 miles in length, in a straight line to the north-west. It must drain all that immense mass of mountains, some 16,000 feet high, on the north-west; and the only way to learn anything about the country would be to ascend that great water highway. It was of no use merely touching the shores, because the forest prevented any exploration more than a few miles inland. This was a case in which the several colonies of Australia might well unite in a common effort to send a small expedition to ascertain what New Guinea really is like. It would never be known from the attempts of Russian, Italian, and general travellers, although these had done wonders. A couple of small, light-draught, well-armed steam-boats could readily venture into the interior, and really ascertain something about the country.

Dr. MULLENS said that, five years ago, the Directors of the London Missionary Society had their attention drawn to the shores of New Guinea, and since then various missionaries, who had had long experience in the South Seas, had visited different parts of the coast. About two years ago they were enabled to commence systematic operations there, and established their headquarters at Somerset, Cape York. It was an interesting fact that, in the great projecting eastern point of the island, the two races of Papuans and Malays were both found; and Mr. Murray, one of the missionaries, was of the same opinion as Captain Moresby—that in the neighbourhood of Yule Island the fusion of the races took place. In a letter which he had recently sent home, Mr. Murray had, however, stated that near Port Moresby the population was unmixed, and were exactly similar to the inhabitants of the Navigators' Islands. Though but little was yet known of New Guinea, what had been done was by no means to be despised.

Mr. P. L. SCLATER said that New Guinea was of special interest to naturalists, on account of the many wonderful forms of animal life that prevailed there, and particularly because, so far as was at present known, the birds-of-Paradise were confined to that and the neighbouring islands. Previous explorers had directed their attention only to that part of the island lying to the west of Geelvink Bay. The Dutch had dominion over the whole of the Molucca Islands, and they were the first who explored that end of New Guinea. Their earliest settlements were in Geelvink Bay, and they also partly explored M'Clure's Inlet. Then one of the great French expeditions passed some time at Port Dorey, and made some collections in natural history. Mr. Wallace also spent a considerable time there, and within the last two or three years, such were the obvious advantages to be derived from an expedition to New Guinea, that naturalists from three different parts of the world had gone there to collect—M. D'Alberty and Dr. Beccari, two Italian gentlemen; Dr. Meyer, a German; and M. Miklucho Maklay, a Russian; but they had all gone to the northern end. M. D'Alberty,

however, on his voyage back to Sydney, did touch at a place near Port Moresby, and got the skin of a very fine new Paradise-bird (*Paradisea raggiana*). At Sydney also he purchased from one of the officers of the 'Basilisk' a small kangaroo, which he brought home and deposited in the Zoological Society's Gardens. The surgeon of the 'Basilisk' brought home a cassowary from the southern part of New Guinea, and that also was now in the Zoological Society's Gardens. Both these animals were new, and of very great interest. It was much to be regretted that Captain Moresby had not a naturalist with him, because there could be no doubt that splendid discoveries might have been made. M. D'Albertis, as soon as he heard that there was a chance of penetrating into the southern part of New Guinea, had started again from Europe, and at the date of his last letters was at Port Somersset, preparing to go across to Port Moresby, and hoping to make as fine a collection as he had already made in the northern part of the island. If any other expedition for the survey of New Guinea were sent out from this country, he trusted it would be accompanied by a naturalist.

Sir CHARLES NICHOLSON said there seemed to be very little doubt as to the existence of gold in New Guinea. That was a most unfortunate circumstance, because it would be the means of attracting a great number of lawless, reckless people from the Australian colonies, who, instead of carrying civilization and religion, and humanizing influences to the natives, would entail upon them a great deal of misery, and commit acts of violence upon those with whom they came in contact. It was therefore most important that the British Government should be alive to this fact, and should take some measures with a view of preventing lawless inroads into the island. Would it not be a proper thing for the Imperial Government to occupy some such position as Yule Island? The idea of taking possession of the whole of New Guinea and treating it as a colony was simply preposterous, for England had no shadow of a right to do any such thing, and the climate would be adverse to any European community attempting to settle there. It was, however, quite a different thing to endeavour to establish commercial relations with the natives; and if they could be taught the value of money, the means of extracting the gold from the rocks in which it abounds, the benefits to be derived from the development of the products of the island and the pearl-fishery, and if, moreover, humanizing and christianizing influences could be brought to bear upon them, under the protection of the Imperial Government, England would do honour to herself, and achieve all that could be desired with respect to those interesting races. He suggested that steps should be taken to draw the attention of the Government to the desirability of occupying some small point for protecting the traffic which would be sure to spring up by the new route between the Australian colonies and China. He agreed with Mr. Sclater in recommending that a naturalist should accompany any future expedition to the country. It was a singular fact that New Guinea might be regarded as an outlying portion of the great Australian continent, the fauna and flora being the same in general character.

The PRESIDENT, in conclusion, said he was quite aware that a great part of New Guinea had not been explored, but it had been tapped in so many places that it could no longer be regarded as a *terra incognita*. Dr. Meyer had actually crossed it from one side to the other, and M. D'Albertis intended to go as far inland as he possibly could. The Russian savant, M. Maclay, had also gone back to the island, so that considerable progress was being made. No doubt Sir Charles Nicholson's suggestion as to the desirability of establishing some protection there deserved great attention, and perhaps the present was a most favourable time for bringing the subject before the Government. The Protectorate of the Fiji Isles had only recently been

assumed, and it would not be a very great step further to occupy some point so as to guard the line of traffic between Australia and Eastern Asia. Rumours were occasionally heard of a scheme for forming a great confederation of Australia, Tasmania, and New Zealand, but it would be long before such an idea would be realized. In the meantime all that England could do was to endeavour to spread humanizing and christianizing influences by means of her officers, her travellers, and her missionaries. No one could question that missionaries had been successful, to a certain extent, in civilizing the races with whom they came in contact, and the Royal Geographical Society was very much indebted to them for the information which they had occasionally given of the general geography of the countries they had visited.

Meeting of March 8th, 1875.

CAMERON'S DISCOVERIES ON LAKE TANGANYIKA.

THE President, Sir HENRY RAWLINSON, took the chair at 8.30 P.M. The meeting was crowded, and among those present were Mr. and Mrs. Cameron, Sir Bartle Frere, Mr. Prinsep, Mr. Galton, Major Euan Smith, C.S.I., and Mr. Allen Young.

The PRESIDENT, in introducing the subject of the evening, reminded the Society that at the meeting of December the 14th, a letter had been read from Lieutenant Cameron, announcing that he had circumnavigated Lake Tanganyika, and had discovered its outlet. Until the present meeting, however, the Council had not been able to bring the full result of his labours before the Society. Mr. Markham, who had always taken great interest in African exploration, had extracted the chief passages from Cameron's diaries, the entries in which were necessarily somewhat disjointed, and had formed them into a connective narrative. Tanganyika was one of the largest fresh-water lakes in the world, being 350 miles in length, and extending over a superficies of above 10,000 square miles. Hitherto it had been laid down on the maps generally in a northern and southern direction; but Lieutenant Cameron's observations, which to a certain extent were anticipated by Dr. Livingstone, showed that its real direction was N.N.W. by S.S.E.

Mr. CLEMENTS MARKHAM then read the paper on the Examination of the Southern Half of Lake Tanganyika, by Lieutenant V. L. Cameron, R.N., compiled chiefly from Lieutenant Cameron's Diary.

The geographical work performed by Lieutenant Cameron during his voyage round the southern half of Lake Tanganyika will form the principal part of the present paper. The explorer has transmitted his journals to this country in the form of diaries, entered day by day. This is quite right, and it is the form most valuable to our map compilers, and to those whose business it is to examine and scrutinize the work. It is not, of course, a form which is adapted for reading, and it has consequently been necessary to recast the portions of Cameron's notes which are to be brought to your notice, into the shape of a consecutive narrative, at the same time using his own words as closely as possible. I have undertaken this task with some diffidence; but I hope to be able to bring before you the principal points, and to do justice to our absent countryman.

Lieutenant Cameron's discoveries did not commence with his survey of the lake. Even when travelling over trodden ground, Bagamoyo to Unyanyembe, he took regular astronomical and hypsometrical observations, and has sent home careful route-maps and journals. After leaving Unyanyembe, he selected a route to the south of that of Captain Burton, and to the north of Mr. Stanley's route, which enabled him to explore a previously unknown tract, and to make discoveries connected with the drainage-system of the southern part of the basin of the river Malagarazi, the most important eastern tributary of Lake Tanganyika.

Mr. Markham then gave some account of the route taken by the explorer, from Unyanyembe to the river Malagarazi, details of which will be found at p. 177 of our number for August 1874.

Before entering upon the details of the service that Lieutenant Cameron has done to geography, by the examination of the southern half of Lake Tanganyika, Mr. Markham recapitulated the extent to which this most interesting sheet of water had previously been examined by Burton and Speke in 1858, and by Livingstone and Stanley in 1871, and the conclusions respecting the hydrography of the Tanganyika which were arrived at by those explorers. The exact scope and nature of the work which remained for Cameron to do will then be more clearly evident.

Captain Speke crossed from Ujiji to the island of Kasenge, near the western shore, in March; and Captains Burton and Speke explored the portion of the lake north of Ujiji, in two open canoes, in April and May. Burton also collected an extraordinary amount of information from the Arabs. As the result of his exploration and inquiries, he states his general views respecting the lake. He describes it as giving him the impression that it was a volcano of depression rather than a reservoir formed by the drainage of mountains. As regards the northern half, the walls of the Tanganyika basin rise in an almost continuous curtain to a height of 2000 or 3000 feet. Burton found the water of Tanganyika to be deliciously sweet; yet a careful investigation led him to the belief that the lake receives and absorbs the whole river system of that portion of the Central African depression, whose watershed converges towards the great reservoir. Burton and Speke, owing to failure of provisions, were unable to reach the northern extremity, but they were informed that the Rusizi flowed into the lake at its northern, and the Marungu at its southern end. Burton had himself descended the incline for 240 miles on the eastern side, until he came to the shores of the lake, and had seen that the Malagarazi and other rivers flowed into it. He therefore conjectured that Lake Tanganyika had no outlet, suggesting that it maintains its level by an exact balance of supply and evaporation. He accounted for the freshness of the water by the saline particles deposited in it being wanting in some constituent which renders the salt evident to the taste. This view was always supported by our late medallist, Dr. Beke.

Dr. Livingstone and Mr. Stanley, following in the track of Captains Burton and Speke, explored the northern half of the lake in November 1871, and succeeded in reaching the mouth of the Rusizi, which was filled with large, reedy, sedgy islets. There was a current of 2 miles an hour flowing into the lake. The latitude was $3^{\circ} 18' 3''$ S. On leaving Ujiji a second time, Livingstone and Stanley coasted along the east shore to the south, from December 27th, 1871, to January 2nd, 1872, as far as Urimba, where they landed.

Thus the northern half of the lake had been well explored from the Vibanga River on the east side, and Kasenge Island on the west, to the northern extremity. But, when Cameron reached Ujiji, the southern half had never been explored, and was unknown except at a few points where it had been touched by Livingstone in his various journeys.

In 1868 Dr. Livingstone reached the southern extremity of the lake, which he describes as a deep basin, with sides perpendicular and covered with trees; the rocks a red argillaceous schist, down which flow several cascades. He was at the village of Pambete on the shore, and fixed the latitude at $8^{\circ} 46' 54''$ S. This latitude is very important, as will presently be seen, because it furnishes independent evidence of the accuracy of Cameron's work. On February 14th, 1869, when very ill, Livingstone again reached Lake Tanganyika at a point on the west coast, under the escort of his Arab friend Muhammad Bugharib. The place was called Parra, at the confluence of the river Lofuko. He

embarked on the 26th, but his illness was so severe that there was no attempt at an examination of the coast; and the voyage is described in half a page. Dr. Livingstone makes one remark of interest relating to the lake in this part of his journal. He says:—"Tanganyika has many deep bays running in 4 or 5 miles; they are choked up with aquatic vegetation, through which canoes can scarcely be propelled. When the bay has a small rivulet at its head, the water in the bay is decidedly brackish, though the rivulet be fresh; but as soon as we get out of the shut-in bay or lagoon into the lake, proper the water is quite sweet, and shows that a current flows through the middle of the lake lengthways."

During his stay at Ujiji, Dr. Livingstone attentively observed the phenomena of the lake. He found that the water was encroaching on the eastern side, and that there was a current from south to north. The Ujiji Arabs were of opinion that all the water, both in the south and north, flowed into the lake, but where it then goes they have no conception. The current flows north from February to November. Evaporation is at its strongest in the south part in November, and there is a southerly current from November to February. The flow and reflow are the effect of the rains and evaporation. The floods of the great rains in February again drive the water north. But for the current, Dr. Livingstone believes that the lake would be covered with *tika-tika* or aquatic vegetation. He crossed the lake again to Kasenge Island in July 1869. On his last journey Dr. Livingstone skirted parts of the south-eastern shore of the lake. He first sighted it on October the 8th, 1872; and saw it at a distance again on the 11th. On the 13th he travelled along the top of a range of hills lying parallel to the lake, and 1000 feet above it, and he continued to skirt the shores until the end of November. In latitude $7^{\circ} 52'$ S. he gives the width of the lake at 12 or 15 miles.

Dr. Livingstone, in July 1869, seems to have held the opinion that Tanganyika has no outlet: for he says, were it not for the current, the water would be salt. In November 1871 he had not the slightest doubt that the lake discharged somewhere, and says that the outlet of the lake is probably by the Rogumba River into the Luabala. But the Rogumba, or Logumba, certainly falls into the lake.

Such was the state of knowledge when Lieutenant Cameron reached Ujiji. Excepting that Dr. Livingstone had visited Pambete on the southern coast, and had skirted along a portion of the south-eastern side, often at some distance, the southern half of the lake from Urimba on the east side, round the south end, to Kasenge Island, near the western shore, was unknown, and required to be explored. Moreover, if there was an outlet at all, it must be somewhere along this unexplored coast-line of nearly 600 miles, for the northern half of the lake had been twice examined. There was a geographical discovery of the first importance to be made which was involved in the careful examination of the southern half of the lake, and Lieutenant Cameron has now achieved this discovery.

His first duty was to establish a good point of departure, by fixing the position of Ujiji, and, in the instructions given to him by Sir Bartle Frere, he was also specially enjoined to ascertain accurately the height of Lake Tanganyika above the level of the sea.

Lieutenant Cameron found the latitude of Ujiji, by meridian altitudes, to be $4^{\circ} 58' 3''$ S., and by dead reckoning $4^{\circ} 55' 30''$ S. His longitude of Ujiji, by lunar observations, is $30^{\circ} 4' 30''$ E., by dead reckoning $29^{\circ} 59' 30''$ E. The point of departure for the dead reckoning was at a distance of 200 miles, checked only by meridian altitudes, so that the results establish confidence in all the intermediate work. His observations for ascertaining the height of Lake Tanganyika above the level of the sea are by far the most complete that have ever been made either on or near any of those inter-tropical African lakes. On February 27th Cameron

observed, with seven of Casella's boiling-point thermometers, which gave the mean result as $207^{\circ} 54'$, and recorded the barometric height and temperature simultaneously. Next day he observed with two of the mercurial barometers, invented by our map-curator, Captain George, which he filled on the spot. He also observed with four aneroids, the results of which cannot yet be computed; but there was almost an exact agreement between the thermometer and barometer observations. The height of the lake proved to be 2710 feet.

Cameron's result is more satisfactory than any that had previously been obtained, because it was got by several methods; and this was the first time that a mercurial barometer had ever been used there. But it corroborates the general accuracy of Dr. Livingstone's former observation; and, in this instance, as well as in his survey of the lake, Lieutenant Cameron has done a service to the memory of his great predecessor, in having established the correctness of his work by independent evidence; for Cameron was entirely unacquainted with Livingstone's results. This consequence of his labours will give the young lieutenant, who suffered so much with the object of succouring Livingstone, even more pleasure than can be produced by the feeling that he has achieved a distinguished place as an African explorer.

Having thus carefully established a fixed point of departure, Cameron made preparations for his great work—the thorough examination of the southern half of Lake Tanganyika.

The voyage during which the survey was made, and the outlet discovered, is described in the articles at p. 1 of our number for January 1875, and at p. 71 of our number for March 1875. The latter article is illustrated by Cameron's map of the part of the lake explored by him.

The most interesting part of Cameron's survey is the discovery of the Lukuga outlet. Lieutenant Cameron himself is inclined to doubt the outflow being constant, and to think that, in the dry season, or when the lake is at its lowest level, little or no water leaves it. He, therefore, resolved to make a further and more extended examination of the Lukuga, on his way to the Lualaba; and by this time his intention no doubt has been carried out, although we may not receive the results for a long time. Meanwhile the various facts already recorded respecting the width and depth of the Lukuga, its current, the nature of the bars and sand-banks, the taste of the water, &c., will supply material for speculation and for interesting discussion, especially if they are considered in relation to the size and shape of Lake Tanganyika, and to its general hydrography. The difference of latitude between the northern and southern extremities of the lake is $5^{\circ} 29'$, or 329 miles, and the whole length something greater, while the width varies from 10 to 25 miles. The level of the lake is said to vary from 8 to 10 feet between the end of the rainy and the end of the dry season, and the rivers become much diminished in size. The current flows from north to south during two-thirds of the year, from February to November, and to the south from November to February, when evaporation is at its strongest at the southern end. Thus the general flow of the current is due to causes connected with the course of the seasons and with the winds, and is not influenced by the position of the outlet.

With these facts before us, it will be interesting to consider the phenomena described by Cameron in connection with the Lukuga. That it is an outlet is beyond dispute, for the current was observed to be flowing out, huge pieces of wood were being drifted down, and the rate was actually measured in a position clear of the wind. The question is, therefore, whether the outflow is permanent or temporary; and the first point is its sluggish character. The current was only flowing out at a rate of about a mile an hour, but this is no reason for doubting the permanency of the outflow. One of our most distinguished medallists recently pointed out that

rivers flowing from lakes do not, as a rule, issue with strong currents, even though these rivers have, lower down, a very strong current, with rapids or falls. The Niagara River, in the words of Sir Charles Lyell, "glides along at first with a clear, smooth, and tranquil current." The St. Lawrence, too, issues calmly from Lake Ontario. The River Kirkaig, on the west coast of Sutherlandshire, when "in spate," issues from Lake Kirkaig with a trivial current, though afterwards it has a fall of 30 or 40 feet, and is a torrent nearly all the way to the sea. Its neighbour, the Inver, is another example of the same thing.

The fact of the existence of an accumulation, analogous to a delta, and of a bar at the entrance to the Lukuga, is another point for discussion. Ordinary bars are of course formed by the water of rivers flowing into a lake or sea meeting the opposing force of the waves. But the accumulations at the entrance of an outlet from a lake might, perhaps, have a different origin. At the season when the streams flowing into the lake bring down most grass, and when the outlet causes a set towards itself from the greatest distance, then the outlet would draw in the largest quantity of floating matter. When the waters of the lake subside, much of this accumulation would remain in the bay round the outlet, and give rise to the formation of such a morass as is described by Cameron. The authority whom I have already quoted mentions that the Amazon valley channels often get thus choked up in the season of floods. The sill or bar would be caused by the existence of a band of hard clay or rock.

There is the further evidence of the Lukuga being a permanent outlet in the fact that, while there are steep cliffs and mountains round almost every other part of the lake, here the mountains sink down into a plain on the north side very abruptly, and there is no high land visible in the distance in the direction of the Lukuga's apparent course. On the other hand, it may be that the outflow only takes place during a portion of the year. Instances are not infrequent of lakes which formerly had outlets, from which the water has ceased to flow, owing to the level having sunk in consequence of the lake receiving a much smaller quantity of water than formerly. There are also lakes, whose outlets were once rivers, but are now mere swamps, such as Lake Balaton in Hungary. Tanganyika may possibly be another instance. All these are subjects for discussion.

But the question whether Lukuga is a permanent or an intermittent outlet, can in no way affect the credit of its discovery. Lieutenant Cameron was himself doubtful on the subject, and is by no means committed to any theory. He has made a careful survey of the previously unexamined portion of the lake, and found ninety-six rivers flowing in, besides torrents and springs, and one, the Lukuga, flowing out. And he sends home his results, which he has zealously and carefully collected.

Those results are by no means confined to the geographical discoveries which have now been briefly submitted to you. His ethnological materials are also valuable, and his journal is full of notes descriptive of the people he encountered, of their personal appearance, dress, ornaments, and habits, arms, agricultural implements, method of spinning cotton and making pottery, and of their huts and granaries.

He also made an extensive botanical collection, which unfortunately got wet on the way down to the coast. However, it has been submitted to Dr. Hooker, the President of the Royal Society, who finds that 101 specimens are fit for preservation, of which about a dozen are clearly new to science. These are all in a state which will admit of their being so described that they can be identified. About thirty-five were common African plants, and as such identifiable as they lay, and the names were catalogued. Dr. Hooker intends to send a notice of the collection to the Linnæan Society for publication; and he has expressed surprise that

Cameron could have done so much. "Had the collection escaped soaking," he adds, "it would have been a very fine one: as it is, it is very interesting, independently of the *flora* to which it belongs being otherwise utterly unknown."

Lieutenant Cameron has also sent home a small geological collection, which has been placed in the hands of Mr. Prestwich.

As regards our explorer's strictly geographical work, it may be summed up as follows:—

1st. He has discovered and explored two of the chief southern tributaries of the Malagarazi, and the chain of mountains on the right bank of the Sindy.

2nd. He has finally fixed the height of Lake Tanganyika above the sea, by observation of the mercurial barometer.

3rd. He has explored and made a careful compass survey, checked by meridian altitudes, of 560 miles of coast-line round the southern half of Lake Tanganyika.

4th. He has discovered the drain which connects the Likwa with the Tanganyika, and has fixed its position.

5th. He has discovered the outlet to Lake Tanganyika.

Lieutenant Cameron has thus done most valuable and distinguished service to geographical science, and the results are in your hands. In my opinion, he has proved himself to be an able, a diligent, and a careful explorer; undaunted by dangers, not to be deterred by illness or hardships, and admirably adapted, by his tact and kindness, for the management of natives. I hope for your concurrence in this view. He has already rendered good service. He is now gallantly attempting to achieve one of the most hazardous and difficult exploits ever undertaken by an English traveller. That he may succeed, and that he may be restored to his country and his friends, must, I think, be the sincere and hearty wish of every geographer.

Sir BARTLE FRERE said all the Fellows of the Royal Geographical Society might feel proud of the young officer to whom they had entrusted so great a charge, and quite satisfied with what he had already done. It was worthy of note how closely he had complied with the instructions which were given to him. He was told to do all he could to complete and extend Dr. Livingstone's discoveries, and, instead of starting off upon any new will-o'-the-wisp of his own he had steadily set himself to work to fill up the gaps in the work of his great predecessor. If he carried out what he had now undertaken, namely, the following up of the apparent outlet of the lake, whether he ultimately reached Colonel Gordon, by way of Albert Nyanza, or the Portuguese possessions on the West Coast, he would do a work which had very few parallels even in the great discoveries of African travellers. The Society might now hope, any day, to hear what he had been doing during the twelve months which had elapsed since his voyage around the southern half of Tanganyika. Mr. Markham had not in the least overstated the importance of his discoveries so far. Captain Burton had inclined to the opinion that this great lake was a volcanic depression, and no one who looked at its outline, as now for the first time presented, could fail to be struck by its extraordinary resemblance to the great American cañons, or the great rifts which Livingstone discovered further south. It seemed as if, in the raising of the continent, the upper strata had been torn asunder, and the edges left some 15 or 20 miles apart. The character of the sides, with the exception of the one apparent outlet, favoured that supposition; and he asked the members to recollect what Sir Frederick Goldsmid and his companions had stated with regard to those valleys in Mekran and Southern Persia, where a river after entering a valley, running almost across it, flowed a short distance along in its new direction, and found an outlet very much in the same direction as its original course. If they supposed one of those great valleys in Mekran or Southern Persia uplifted on its seaward side, it would produce just such a lake as Tanganyika, with, perhaps,

an outlet over a depression towards the sea. This view might or might not be confirmed by further observation, but it was very curious that the facts ascertained by Lieutenant Cameron so far bore out what Captain Burton only suspected. Hardly sufficient weight had, he thought, been given to the possible effects of the continuous monsoon wind acting upon a long trough of such a character as Tanganyika. The great American engineer, Mr. Elliot, in his work on the Mississippi and Missouri, calculated the amount of elevation which might be given to a reach of a river 5 or 6 miles in length, by a continuous wind, and estimated it at as much as 8 inches on some of the reaches of the Missouri. Those reaches, of course, were very short when compared with the length of an immense trough like Tanganyika; and a monsoon, blowing almost directly either up or down such a trough, would produce such an elevation at either end as to reconcile the apparently contradictory statements of people who had observed it at different times of the year. Only a few months ago Sir Samuel Baker, at one of the meetings of the Society, stated his belief, founded on what the Arabs had told him, that occasionally, if not annually, there was a communication between the north of Tanganyika and the Albert Nyanza, and Mr. Major had more than once said that he could not help thinking that there might have been some foundation for the statements of old discoverers, 200 years ago, apparently on the evidence of the Arab and Negro traders of that day, that there was such a communication by a low morass, not always covered with water, but at times giving access from Tanganyika to the great lakes to the north. The facts stated by Lieutenant Cameron would, at any rate, enable geographers to suspend their judgment as to the theories of the old Portuguese discoverers, and prevent their being too dogmatic on the subject, for it was evident that, even without supposing any great variation in the rainfall, there might be a great difference in the height of the lake at the two ends. Mr. Markham had called attention to the various bars at the mouths of the rivers, but they must not be too sure that those bars either proved or disproved an inlet or an outlet, because all naval officers and harbour engineers would agree that a bar formed wherever there was a change in the direction, or in the rate of progress, of water laden with sand and silt. If during the prevalence of the wind, which had such an effect that the surf beat up the sand in the shallow waters near the coast, and carried it in a semi-suspended state along the bottom, the flow came to an outlet such as that in which Lieutenant Cameron had sheltered in still water, the sand would be deposited and a bar would be formed, whether the water was flowing out or in. Here again was another reason for suspending judgment until further information was received. The facts that had been mentioned with regard to the heavy drifts were very much in favour of a great outlet, and the conditions appeared to be very similar to those described by Sir Samuel Baker and Colonel Gordon as existing on the northern outlets of the Albert Nyanza. All these things showed how much yet remained to be ascertained before it could be said with certainty that the true theory of the Tanganyika had been ascertained; but there could be no doubt as to the great amount of information which had been obtained by Lieutenant Cameron, who well deserved all the praise which had been given to him.

The Rev. HORACE WALLER said he had hoped that Lieutenant Cameron's map and notes would have passed into the hands of the Royal Geographical Society, but he regretted to find that other means had been taken to make them public. The map was not yet in the hands of the subscribers, though it had appeared in the *Geographical Magazine*, a private periodical.*

* It is quite unusual for the Geographical Society to publish maps in the *Proceedings*, or to place copies in the hands of subscribers before the appearance of the *Journal*, in the year following

The PRESIDENT interposed by remarking that the Geographical Society considered the *Geographical Magazine* a very valuable auxiliary in communicating early geographical information to the public. The Geographical Society was not a publishing or a mercantile establishment. It was simply instituted for the purpose of obtaining and circulating geographical information, and was very much indebted to any journal or individual which assisted in giving publicity to anything which was novel or interesting in a geographical point of view.

Mr. FRANCIS GALTON said that, some twenty years ago, the well-known phenomenon known as the *Sèche*, in Switzerland, attracted considerable attention. When a violent wind was blowing, a difference of level between the two ends, of no less than 2½ feet, might be produced in the little Lake of Geneva. In a lake of such magnitude as Tanganyika therefore the difference might be very considerable. All who had watched Lieutenant Cameron's expedition must extremely rejoice that, after all the misfortunes and delays that occurred in the early part of it, it should have been reserved for Lieutenant Cameron to discover what appeared to be the outlet of the lake, and to establish implicitly that the head-waters of the Congo were the Malagrazi River.

Dr. PERCY BADGER said that Lieutenant Cameron had called upon him before he set out upon his expedition, and asked him regarding the best way of getting on with the Arabs. The advice which he (Dr. Badger) gave, was "Keep your temper." At Zanzibar he inquired frequently of the Arabs what they thought of Cameron, and the reply invariably was, that he was the most kindly-dispositioned and generous man they had ever met with.

The PRESIDENT remarked that Lieutenant Cameron himself had never put forward a positive claim to having discovered the outlet of Tanganyika. In his journal he gave the *pros* and *cons* with the most perfect sincerity and impartiality. He would willingly have convinced himself that the Lukuga was the outlet, but he constantly heard adverse rumours, and in the journal which had been sent home he really left the question doubtful. By the last accounts he was proceeding to satisfy himself whether it really was an outlet into the Lualaba, or merely into some lagoon which interposed between Tanganyika and the Lualaba. The only place south of Tanganyika where such an outlet could be, was just where Lieutenant Cameron had found the Lukuga, where the coast was depressed, and where there was apparently a natural opening in a south-west direction, leading, as the Arabs said, to the Lualaba, between the lakes Moero and Kamalondo. The natives, too, told Lieutenant Cameron that they passed by that outlet, *i.e.* along the banks, to the Lualaba and Nyangwe. It was, however, still a doubtful point, and could not be settled until further information was received from Lieutenant Cameron. It could hardly be expected that he had followed the west shore of the lake from Kasenge to the north; for by the last accounts his intention was to proceed to Manyuema, and thence to follow the Lualaba to its outlet—whether north to the Albert Nyanza, or west to the West Coast of Africa. It was now ten months since he started on his journey from Ujiji, and if he had found that the Lualaba was the Congo, he ought by this time to have reached the Yellala Falls. At any moment, therefore, definite intelligence of his whereabouts might be expected. It was satisfactory to know that both the

their receipt. It was, as a special case, resolved that Cameron's map should appear in the *Proceedings*, and it would in the ordinary course have appeared before the publication of our March number, in which a similar map, but with various additions, and on a different scale, illustrates the article on Cameron's survey. There was some delay in the issue of this number of the *Proceedings*, but it has long since been supplied to Fellows of the Society.

Foreign Office and the Admiralty had sent out instructions to all the naval and consular officers on the West Coast of Africa to look out for him, and to endeavour to obtain news of him from the traders who came to the coast from the interior. If they met him they were directed to give him every possible assistance, and to send him with all speed and despatch to his native land.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

THE usual monthly meeting of the Society was held on the 5th (17th) of February. After enumerating the most important additions to the library during the preceding month, M. Wilson, the Secretary, referred to the work of M. Chekanofsky, in Northern Siberia, allusion to which has more than once been made in our columns. M. Chekanofsky's expedition was prolonged last summer for the space of a year, in order to give him an opportunity of studying the water-system of the Khatanga and Anabara Rivers, as well as the *tundras* or frozen marshes between the Lena and Yenisei Rivers. On his return to Irkutsk, however, M. Chekanofsky represented that he stood in need of further assistance from the local authorities, and that a year was insufficient for the completion of his proposed researches. The council were of opinion that the material collected on the occasion of the first journey to Olenek and Lower Tunguska stood in need of being arranged and utilized first of all, and with that view the projected journey to the Khatanga and Anabara was abandoned, half the amount voted on that account being credited to the reserve fund, and half to the utilization of the former results. A silver medal was awarded to a Cossack petty officer, who had despatched a vessel at his own expense down the Anabara to cooperate with the expedition.

M. WILSON then announced that the council had arranged for the execution of some levelling work in Siberia. The plan of operations had not yet been fixed; the work, however, will be under the direction of M. A. Thilo, and will be carried out with instruments of a high degree of accuracy, as in Switzerland. Similar instruments were used for the first time in Russia, in the levelling between Aral and the Caspian, and the results are thoroughly reliable. The finances of the society do not, unfortunately, admit of their contributing largely to this undertaking; it therefore appeals to the public, and thankfully acknowledges some aid already tendered.

With reference to the approaching Geographical Congress in Paris, His Imperial Majesty had announced his wish to send for exhibition in the ethnographical section a unique collection of Khivan ornaments and precious stones.

M. JILINSKY then read a paper on the proposed desiccation of the marshy region in Pinsk. These marshes extend between Mohilef, Brest-Listofsk, and Kief in the form of a triangle of about 80,000 versts in extent, or an area seven times as large as that of Saxony, and four times that of Belgium. The lecturer then described the economic, sanitary, and hydrographic features of the marshes, and ascribed their existence to the vicinity of the points of confluence of the Pripet, Goryna, Slouch, Styra, Stakhod, Tuva, and Yassobia Rivers, which frequently inundate the adjoining country for a continuous distance of 20 versts. A secondary cause may be found in the frequent mill-dams and fish-weirs which occur. During the summers of 1873 and 1874 M. Jilinsky levelled over about three-quarters of the whole region, examined the currents and depths of the streams, and their annual rises. He also made some experiments in the drainage of a tract between the Pripet, Dnieper, and Beresina, which tract is traversed by an affluent of the Dnieper—the Vedretch—the course of which is obstructed by mills and weirs, and the waters are thus forced above its banks. By the

construction of drainage channels, the water was carried off, and an area of 120 square versts reclaimed. Two other equally successful experiments were made; one close to Lake Jid, which proved to be higher than the River Pripet, the intervening ground having a slope of about 1 in 250. The whole of the superficies of the province of Minsk has a slope of from 3 to 5 in 1000, which would admit of the waters being rapidly carried off by canals into the Pripet and Dnieper, a measure which will most materially benefit the forest vegetation, which at present suffers from excess of humidity.

M. Jilinsky's paper was listened to with deep interest, and after the announcement of the election of some new members, the meeting broke up.

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VIENNA GEOGRAPHICAL SOCIETY.

AT the meeting of the Society held on the 23rd of February, under the presidency of Dr. Ferdinand von Hochstetter, it was announced that Lieutenant A. E. Lux, who is to accompany Captain Homeyer to the African coast, in the capacity of surveyor, had already started from Liverpool. These two gentlemen are attached to the German African Expedition, and propose to penetrate into the interior from some point on the coast south of the Congo.

Letters were also read from Consul Hansal, at Khartum, and from Herr Marmo, on his way to join Colonel Gordon's Expedition. The former stated that Lieutenant-Colonel Long had arrived at Khartum, after having visited the region of the White Nile, and having been hospitably received by King Mteshi, who presented his guest with six female attendants, one of whom was Mteshi's own daughter, a young woman of the Gallas type, and quite different from the negro race. Mteshi made many protestations of friendship and promised to divert the ivory trade from the Zanzibar route towards Gondokoro. Long found that the Victoria Nyanza was no more than 15 miles across, and in latitude $1^{\circ} 30' N$. he discovered a smaller lake, probably connected with the former. He experienced a friendly reception at the hands of Rionga, a chief with whom Sir S. Baker had left a garrison, but was attacked by the king of Unyoro, at the head of four hundred savages, who were fortunately routed with a loss of eighty-two slain. Long was away altogether six months, and was made by the Khedive a full colonel for his exploits, besides receiving the order of the Medjidie (3rd class). Abu Saood, Baker's old friend, has fallen into disgrace through concocting some intrigues with two other officials. Gordon promptly discovered the plot and packed off the mutineers forthwith.

Herr Marmo* writes from Fashodah, on board the Khedive steamer, to the effect that at Suakin he was provided by order of the Viceroy with camels for his journey to Berber, and with everything else he could possibly require. Berber was left on the 19th of November, and five days' steam brought them to Khartum. The steamer is one built by Baker in Gondokoro for navigating the Albert Nyanza with. It is very small, uncomfortable, and the engine fires emit sparks to a dangerous extent, so that men have to be constantly on the watch on board to extinguish incipient fires. On the 5th of December a steamer was met coming down with M. Cechi, one of Colonel Gordon's party, on board, and he brought news that Gordon himself was established at a new-named Fado, situated on some hills of Gondokoro. A messenger had been sent to King Mteshi and the two English engineer officers, Messrs. Watson and Chippendale, to the westward, presumably to explore, while a steamer was being put together at Fabo, so as to be launched on Lake Albert. Herr Marmo, in conclusion, announced his intention of going on to Fabo.

After reading the above letters, Baron Hofmann gave

* See *Geographical Magazine*, for January, 1875, p. 23.

a sketch of Gordon's plan of operations, as gathered from the intelligence received. The object is evidently the overthrow of the Unyoro kingdom, and the attempt to extend the Egyptian dominion beyond the equator. To this end an alliance is being contracted with Rionga, who occupies both sides of the Victoria Nile, and a treaty with Mteshi of Uganda, so as to facilitate flank operations, while important help will be rendered by the steamer being built at Fabo, a former slave station, and which, being above the cataracts, is in direct communication with the Albert Nyanza. Baron Hofmann concluded with an enumeration of the interesting geographical problems which await solution at the hands of this expedition.

JOURNEY OF DR. E. TIETZE IN GHILAN AND MAZANDERAN.

THE provinces of Ghilan and Mazanderan comprise the wooded northern slopes of the Elburz range, and a flat strip of coast land of unequal width between it and the Caspian. This marshy and fever-breeding tract, where rice, cotton, silk and a little sugar is produced, is like the neighbouring mountain slopes, densely wooded in parts, and thus presenting a striking contrast to the bare desert-like land south of the Elburz range. In the mountain forests beeches prevail, and in the lowland lofty oaks, mimosa and other trees; vines and pomegranates grow wild, the box tree attains a height of from 20 to 30 feet, while reeds and creepers form a shelter to the tiger, and deer; boars and pheasants are common game.

In this lowland the geological features are of course of but slight interest. There is a clear proof of the sea having formerly extended to the foot of the mountains in the presence of a steep rocky bank by Ashref, which bears the imprint of the lashing of the waves. About a league and a half east of Puli Nika there are salt springs in a chalk formation, which can only be accounted for by the former presence of the sea. There is also proof that the different tracts which at present go to make up the Mazanderan lowland were formerly separated one from another by arms of the sea, and not by streams as at present.

At Sari a road, which for a portion of the way is a beaten causeway, leads northward to Farahabad, where there are the ruins of a castle of the time of Shah Abbas. A little beyond one comes upon the mouth of the Tedshen River, and a small fishing village called Wateke, situated on its left bank. The coast is marked with sand-dunes and lagoons, and frequented by crows, mews, ducks, cranes, and other birds. The quantity of drift-wood brought down by the mountain streams and deposited on the coast is very considerable (a fact already recorded by Grewingk and Bell), while the mud in spring time colours the sea to a distance of from 5 to 6 English miles from the shore.

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THE
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MAY, 1875.

TRAVELS IN GREAT TIBET
AND
TRADE ROUTES BETWEEN TIBET AND
BENGAL.*

OF all the regions which remain to be explored and fully brought to the knowledge of geographers, that of Great Tibet is among the least known and the most important. No account of this region, derived from the personal observation of an actual traveller, has hitherto been submitted to a meeting of the Geographical Society, with the single exception of that of the Pundit who was sent by Colonel Montgomerie to Lhasa in 1865. It is indeed to that distinguished officer that we owe all our recent knowledge of Great Tibet; and one of the main objects of the present paper is to furnish some account of the more recent journeys which have been made in Tibet by Colonel Montgomerie's emissaries. But I am also able to bring to notice the work of two Englishmen who explored portions of Great Tibet many years ago. The results of their labours have remained hidden in forgotten manuscripts until now, and as no European has since followed exactly in their footsteps, and they are consequently still the most recent European explorers of this region, their narratives continue to be as valuable and as interesting as if they had been written this year. The first of these forgotten explorers is Mr. George Bogle, who was sent by Warren Hastings to the court of the Teshu Lama just a century ago. The second is Mr. Thomas Manning, a private traveller who reached Tibet in 1812, and is the only Englishman who has ever visited its capital—Lhasa. Bogle and Manning are the only two Englishmen who have ever crossed the Tsang-po.

It is necessary that I should first define the limits of the region to which the name of Great or Central Tibet applies. Our general knowledge of that country is still derived from the work of Du Halde, and from the old maps of D'Anville published 130 years ago, and based upon the famous survey of the Chinese Empire undertaken in the reign of Kang-hi and commenced in 1708. Tibet was surveyed by two Lamas who had been instructed and trained by Père Regis and other Jesuits at Peking. Their map extended from Sining to the source of the Ganges, and when it was delivered into the hands of the Jesuit missionaries in 1717, it was found sufficiently accurate and

consistent to enable them to construct from it a map of Tibet, from which D'Anville compiled those which still form the basis of modern delineations of the country.

But although the survey of Tibet was executed by native Lamas, the country was visited by Jesuit missionaries in the 17th and 18th centuries. In 1661 Fathers Grueber and Dorville set out from Peking, and reached Lhasa after a perilous journey of six months, and they eventually crossed a formidable pass into Nepal, and arrived safely at Agra. It is said also that two other missionaries, named Hippolito Desideri and Manoel Freyre, set out from Goa in 1714, and reached Lhasa two years afterwards. But their narrative, after leaving Ladak, breaks off abruptly. Father Horazio de la Penna, with eleven companions, has, however, a strong claim to be remembered. He went from Peking to Lhasa in about 1717, at the very time when the Lama surveyors were at work, and, after remaining thirty years in Tibet, he died at Patan in Nepal in 1747. The results of his labours contain much historical information. They were published at Rome by Father Georgi in 1762, and include a Tibetan grammar. The work of Georgi is the only source from which we derive some knowledge of the succession of the early kings of Tibet.

It is from these, and less accessible Chinese works, that Klaproth, Csoma de Körös, Hodgson, and Henry Strachey, were enabled to define the limits and political divisions, and to give us a general idea of the topography of Tibet.

This most interesting region consists of the elevated plateau in the rear of the first great chain of the Himalaya, which overhangs the Gangetic Valley; and Central or Great Tibet is that portion which is watered by the Tsang-po, or the Brahmaputra in its upper course, and its tributaries. Tibet is divided into four great provinces; namely Kam or Eastern Tibet, of which we know little or nothing, but which is believed to be cut up into deep gorges by the upper courses of the Yangtsé, the Cambodia, the Salwín, and the Irawadi; Ari, or Western Tibet, which has been pretty thoroughly explored by our surveying parties, and the two provinces of U and Tsang, called Utsang, which form Great Tibet. The latter region is bounded on the west by the Marian-la and the mighty Kailas or Gangdisri mountain overlooking the sources of the Ganges and the Sutlej; on the south by the outer range of the Himalaya facing the Gangetic Valley, and containing the loftiest peaks in the world; and on the north by another lofty range, called by Hodg-

* Read before the Royal Geographical Society, April 26th, 1875.

son the Nyenchhen-thánglá chain, which separates the country of villages and cultivation from the nomadic hordes on the still loftier plateau of lacustrine drainage between that chain and the Kuen-lun. The eastern boundary of UTSANG or Great Tibet is not so clear. It can be ascertained by a scrutiny of the lists of towns given by Klapproth and D'Anville as situated in the provinces of Tsang and U, and of Kam or Eastern Tibet respectively, and by drawing a line of separation between them. Such a line places the eastern boundary of Great Tibet along the river Kenpu or Dibong, and includes the whole course of the Tsang-po or Brahmaputra above the outer Himalaya within it. Great Tibet, or the two provinces of U and Tsang, thus has an extent of about 750 by 250 miles, and is a region the inhabited parts of which are from 10,000 to 12,000 feet above the sea, bounded by lofty ranges to the north and south, with an inner range traversing it, and separating the watershed of the Ganges from that of the Tsang-po. It has thus two systems of drainage. The Tsang-po or Brahmaputra traverses the whole region from west to east, and receives tributaries from the Nyenchhen-thánglá range on the north, and the northern slopes of the Himalayan outer and inner chains on the south. The rivers which rise between the inner and outer ranges either flow, like the Arun (Kosi) and the Lopra-cachu* of D'Anville, through gorges in the outer chain to Bengal, or into lakes between the two chains.

This grand plateau may in some respects be likened to the Collao of Peru, lying between the maritime and eastern cordilleras of the Andes. Both sustain great flocks and herds, and in both a similar ruminant is used as the beasts of burden, the llama in Peru and the sheep in Tibet. In Peru the Lake Titicaca, at 12,000 feet above the sea, is used as a means of communication by a line of steamers; in Tibet the Tsang-po is a fluvial highway for merchants and their goods, also at a height of 12,000 feet above the sea. Tibet and the Collao of Peru alike abound in the precious metals, in salt and borax. But Tibet is more difficult of access. On one side the Collao has the maritime cordillera with passes leading to the Pacific coast, on the other the auriferous range of the Eastern Andes overlooking the rich alluvial plains of the Amazon. Great Tibet is more isolated. To the south the mighty range of the outer Himalayan can only be traversed by passes of extreme difficulty, and which are closed by snow during part of the year; while to the north a still more formidable journey over snow-clad plateaux and through fearful mountain gorges, which occupies several months, awaits the traveller who would pass from Tibet to China.

The people of Great Tibet, and their priestly rulers, have a strong claim upon the attention of European enquirers. It is to Chinese exclusive policy, and not to the Tibetans, that our ignorance of their country is due. In former days the intercourse between Bengal and Tibet was frequent and unchecked. The Tibetans are of Chinese race, and their language is allied to Burmese; but their Buddhist religion, their extensive literature, their written character, and their prevailing modes of thought are all derived from India, and prove that, for centuries, there must have been an uninterrupted ebb and flow of commerce through the

now closed passes of the outer Himalayan range. The monasteries in every part of Tibet, even the most inaccessible, with their armies of monks, the innumerable banners and monuments on every pass, all point to ideas which had their origin, and long prevailed, in the valley of the Ganges. The belief which forms the basis of Tibetan polity is of Indian origin too; and the Dalai Lama himself is an incarnation, in a certain sense, of a Hindu prince, the holy and sinless Sakyamuni. More strictly he is the incarnate Bodhisattva, Padmapani, or Avalokitesvara, the heavenly representative of Sakyamuni. The Dalai Lama is the ruler of the province of U, with his capital at Lhasa; but an equally sacred incarnation rules over the province of Tsang, namely, the Teshu Lama, whose capital is at Shigatze, and who resides in the adjacent palace of Teshu-lumpo. The Teshu Lama is an incarnation of the great Tibetan reformer, Tsonkhapa, who flourished in the 14th century. The Tsang-po River has been described as the boundary between the two provinces of the Dalai, and the Teshu Lamas, U being to the north and Tsang to the south. But this is not exactly correct. Bogle mentions Chan-nam-ling, and other towns, north of the Tsang-po, as part of Tsang, while an examination of the lists of towns given by Klapproth and D'Anville shows that several towns reckoned as being within the province of U are south of the great river.

The Lamas say that the intercourse between Bengal and Tibet fell off after the Muhammadan conquests in India; and it was still further interrupted by Chinese interference, and by the turbulent chiefships of Nepal and Bhutan on the outer slopes of the Himalayas. But there was nothing in the state of affairs to prevent a renewal of the old intercourse between Bengal and Tibet, and the establishment of friendly commercial relations, and this was perceived by the great statesman who established and consolidated our Indian empire. Warren Hastings, the first Governor-General, and the only one whose name is a household word among the natives of India, lost no opportunity of extending the influence of the East India Company, and improving the condition of the people under his rule. Not the least important of his measures was the re-establishment of direct intercourse with Tibet, on occasion of the mediation of the Teshu Lama, after the Bhutan war. He resolved to despatch an envoy across the Himalaya, one on whose abilities and discretion he could rely. The great statesman had trained a school of rising administrators, such as Kynynmond Elliot, whose early death in Orissa he so deeply mourned; Cleveland, of Bagulpur, the first to tame the wild Sonthals, and whose name is still remembered among them; George Bogle, and others of equal mark. The choice of Warren Hastings fell upon the young Secretary of the Board of Revenue, George Bogle, who set out for Tibet in company with Dr. Hamilton, an assistant surgeon in the establishment, and an officer of the Teshu Lama, named Paima; and after some detention in Bhutan, the travellers reached Pari-jong. This is the pass at the head of the Chumbi Valley, which divides Bhutan from Tibet, separating the deep and wild gorges, well wooded and fertile, which slope down to the Bengal plains from the bleak plateau of the Tibetan side. In front were the grassy uplands, patched with snow, on which no Englishman had ever before set eyes, and

* Shubanshir, in Assam.

on his right towered the sacred peak of Chumulari, 22,944 feet above the sea. Mr. Bogle, accompanied by Dr. Hamilton, and their Tibetan companion Paima, set out from Pari-jong, and entered Tibet on the 24th of October 1774.

This mission was politically important, and its results were of great geographical value. I think, therefore, that a brief reference to Mr. Bogle's discoveries, and to some of the incidents of his journey can scarcely fail to be interesting.

Four days after leaving Pari, Mr. Bogle discovered two large Alpine lakes called Shamtzo and Calutzo (the first is called Ramtchieu by Turner, the second is not named by him), connected with each other by a stream. He also traced the river flowing out of the Calutzo Lake, and found it to be a tributary of the Brahmaputra, and identical with the Penanang-chu. The name of the second lake, and the direction of the outlet are entirely new geographical facts. The lakes were half frozen over, and well stocked with ducks and other wild fowl. Antelope, *kyang*, and hares were also seen; and it was observed that animal life of all kinds was much more abundant on the bleak uplands of Tibet, than in the wooded gorges of Bhutan.

But here a slight difference occurred between Mr. Bogle and his Tibetan friend, Paima. The British envoy was naturally anxious to have some sport, while the Tibetan looked with horror on acts of bloodshed, especially when actually in sight of the sacred peak of Chumul-ari. Paima strongly objected to shooting, insisting that it was a great crime, that it would give much scandal to the natives, and that it was particularly unlawful within the liberties of Chumul-ari. Mr. Bogle had many long discussions with him on the subject, and tells us that "they were supported on the side of the Buddhist by plain common sense reasons, drawn from his religion and customs; on the part of the British envoy by those fine-spun European arguments which serve rather to perplex than to convince." The latter gained nothing in argument, but at length a compromise was arranged; Mr. Bogle agreed not to shoot until they were fairly out of sight of the holy mountain, and Paima consented to suspend his prohibition in solitary and sequestered places.

The march down the valley of the Penanang-chu, and across the inner chain of the Himalaya to the Tibetan towns of Giantze and Painom has been described by Turner, who followed along the same road a few years afterwards. But Turner never went beyond Teshu-lumpo, while Mr. Bogle crossed the great river Tsang-po near Shigatze, at a point where it is about the width of the Thames at Putney. Having drunk some of its water, washed his hands and feet, and thrown a rupee into it, he embarked in the ferry-boat, of which there were several at this place—well-built flat-bottomed barges, about 25 feet long, consisting of a flooring of thick planks and perpendicular sides about 4 feet high, with an opening at either end, cut down to 2 feet, the whole bound together with bars of iron, and painted white. There was a large oar on each side, pulled by two men, and pushed by another facing them, while a woman helped by hauling on a line made fast to the end of the blade. The steering is managed by a large oar from the stern. The boat carried over twenty-three persons, seven horses, and fourteen asses, besides baggage. The

river is not rapid at this place, and great herds of bullocks and flocks of sheep were waiting on each side for a passage. In the summer a lighter kind of boat is used for transporting goods, made of hides with ribs of willow poles, about 8 feet long by 4 broad. Mr. Bogle saw many of them on the bank, keel up, and some, with one end raised, serving as habitations for the boatmen.

The flocks of sheep are used as beasts of burden. Some were coming from the wild and desolate country to the north, laden with salt; others were returning from Giantze with cargoes of barley. Mr. Bogle describes them as large animals with horns extending horizontally. He met flocks of 1200 sheep, each carrying two bags of grain weighing 20 to 25 lbs. They were very obedient to the shepherd's call, and if any of them happened to stray, they were easily brought back by the shepherd's dog.

After crossing the Tsang-po, Mr. Bogle marched up the valley of the Shiang-chu to Namling, and went thence to a small place called Desheripgay, in a gorge a few miles beyond Namling, where the Teshu Lama had resided for two years owing to the prevalence of small-pox at Shigatze.

The Envoy describes the palace, the retinue, and the ceremonies and receptions with graphic minuteness, and he formed a deep and lasting friendship for the sacred person of the Teshu Lama himself, which had a temporarily important influence on British interests, and, if the two men had lived, might have led to permanently good results. The Lama was then about forty years of age. Although endowed with a portion of omniscience and many other divine attributes, his holiness accommodated himself to the weakness of mortals, and endeavoured to make himself loved rather than feared. The expression of his countenance was smiling and good-humoured; his disposition open, candid, and generous. He was extremely merry, and entertaining in conversation, and told a pleasant story with much humour and appropriate action. Mr. Bogle describes the ceremonies of blessing the people, the religious services, and the grand procession of the Desheripgay across the Tsang-po to Teshu-lumpo, when the Lama returned to his capital. He was on most intimate terms of friendship not only with his holiness, but with his young nephews the Pyn Kushus, and his nieces the nuns, with whom he had a great deal of laughing and merriment. During a week in March Mr. Bogle and Dr. Hamilton went to a country seat of the Pyn Kushus on the northern banks of the Tsang-po, whence they obtained a magnificent view of the windings of the river and adjacent mountains, and where their hosts exerted themselves to amuse them by hunting excursions, and to please them by the most cordial hospitality. For the Pyn Kushus made no scruple about shooting when by themselves, and showed Mr. Bogle some good sport with greyhounds, got up matches with bows and matchlocks, and a grand hunt after musk deer. But they had some fear lest they should get into a scrape with the Teshu Lama, if their transgressions were mentioned to him. On the whole nothing could exceed the cordial friendship which sprang up between Mr. Bogle and the Teshu Lama's family.

When the Envoy finally left Teshu-lumpo on his return to Bengal, on the 8th of April 1775, he tells us that "he took his last farewell of the Lama with

an aching heart, having become strongly attached to him for his civilities, his bewitching manners, and his amiable character." Nor was this friendship of a fleeting kind. A correspondence was kept up between the two after Mr. Bogle had returned and was appointed Collector of Rangpúr. The letters from the Teshu Lama were written in the cursive Tibetan character, on paper made from a species of *Daphne* which grows in Nepal and Bhutan. At Rangpúr Mr. Bogle established a fair, with special immunities and advantages for the Tibetan and Bhutanese merchants, and encouraged the intercourse between Tibet and Bengal by every means that his official position gave him, and with the warm support of the Governor-General.

Unfortunately the good Teshu Lama was induced by the Emperor of China to visit Peking, where he died of small-pox, and in the same year, 1782, Mr. Bogle died at Rangpúr. There can be no doubt that the way had been paved for opening the passes into Tibet for traffic and free intercourse; but the premature loss of the negotiators was a death-blow to the bright hopes that were justified by their friendship. Besides his journal and letters, Mr. Bogle drew up valuable reports on the trade of Tibet, on its religion and politics, and on the people. On his death all his papers were packed up and sent to his friends in Scotland, and they have remained untouched and unutilized, in a house in Ayrshire, until the present year. It is true that Warren Hastings did not lose sight of his plans respecting Tibet, for he sent a second embassy, under Captain Turner, in 1783, which reached Teshu-lumpo, following Mr. Bogle's route exactly, but not going beyond that point. The good Lama was then dead, his successor was an infant, and the only result of the mission was the publication of Captain Turner's interesting narrative in 1800.

The death of the Teshu Lama and of Mr. Bogle, and the retirement of the great and enlightened statesman who placed them in communication with each other, were the unfortunate events which put an end to the friendly commercial and diplomatic intercourse between the two countries, and there were evil influences of another kind at work. In Mr. Bogle's conversations with the Teshu Lama there is frequent allusion to the turbulent and aggressive policy of the Gurkha Raja of Nepal, and to the hindrances he was placing in the way of commercial transactions between India and Tibet. At last the Nepalese army invaded the province of Tsang, and plundered the monastery of Teshu-lumpo. This led to intervention on the part of China, and in 1792 a great Chinese army marched into Tibet, utterly defeated the Nepalese at Tengri-maidan, drove them across the Himalayas, and dictated a humiliating peace within 20 miles of Kathmandu. From that time the political influence of China in Great Tibet has been paramount, and, although the internal administration is not interfered with, Chinese troops remain in occupation, and the exclusion of foreigners is enforced by officially watching the Bhutan, Sikkim, and Nepal passes.

It has been said that the watch is so strict as to render it impossible for any Englishman to have passed into Tibet since 1792; but this is not the case, as is proved by the fact that in 1811 Thomas Manning actually reached the city of Lhasa, although it

is true that he is the only Englishman who ever succeeded.

The journey of this adventurous traveller has never been described, and the manuscript narrative of his adventures has remained unused, in the hands of his family, ever since. This is the second English traveller to whose labours I desire to call the attention of the meeting.

Thomas Manning was a mathematical tutor at Cambridge, who, after leaving the University, brooded over the mysterious empire of China, until at last he resolved to undertake a voyage to Canton, to study the language, and then to attempt the exploration of the unknown interior. Manning was the friend and correspondent of Charles Lamb, who, during 1803, frequently urged his friend to give up the intended visit to Independent Tartary, as he called it. "The reading of Chaucer has misled you," writes Lamb. "Do not credit his foolish stories about Cambuscan and the ring, and the horse of brass. Believe me there are no such things. 'Tis all the poet's invention. A horse of brass never flew, and a king's daughter never talked with birds. These are all tales. Pray try and cure yourself. Take helebore. Pray to avoid the fiend. Read no books of voyages; they are nothing but lies, and do not go to Independent Tartary."

But all remonstrances were in vain, and, armed with a letter of introduction from Sir Joseph Banks, he sailed for Canton in 1806. After remaining there for some years, studying the language, he proceeded to Calcutta, whence, in September 1811, he set out on his adventurous expedition to Tibet. It would appear that he applied to be employed officially as an envoy, for when the Chinese authorities at Pari hinted at overtures for opening commerce between Tibet and India, he exclaims, "I cannot help feeling what fools the Company are to give me no commission, no authority, no instructions. Fools! to neglect an opportunity they may never have again." Manning was obliged to go as a doctor and in disguise, and of course his difficulties were thus multiplied tenfold. Fortunately he encountered a Chinese general on the frontier at Pari-jong, who was civil to him, and with whom he travelled to Lhasa. From Pari to Giangtze he followed the route taken by Bogle and Turner, but there, instead of turning west to Teshu-lumpo, he crossed the inner range of the Himalayas and reached the famous ring-shaped lake of Palti or Yamdok-chu.

Manning's journal is a personal narrative, containing many incidents of the road, and is specially valuable for its account of Lhasa and of the Dalai Lama; but it contains little geographical information, and, if it had not been for the accounts of Bogle, Turner, and the Fundit of 1865, it would not be easy to make out his route. He skirted along the Yamdok Lake for several days, and gives the Chinese name for it as *Haitu* (little sea); but he does not appear to have known the map of D'Anville, or the peculiar form of the lake with its large island as there delineated. He merely says, "from the opposite margin of the lake rose diminutive mountains in a continued chain." He further says that the water of the lake is said to be very unwholesome, and that it is not used for drinking. Manning crossed the Tsang-po in a large and good ferry-boat, and reached Lhasa without further adventures. The Dalai Lama was then about seven years old, and

the traveller was much impressed by the refined beauty of his holiness. He had the simple and unaffected manners of a well-educated princely child. His face was poetically, even affectingly beautiful, and he was of a gay and cheerful disposition, his mouth perpetually unbending into a graceful smile, which illuminated his whole countenance. Mr. Manning's narrative of his stay at Lhasa is full of interest. He intended to have pressed on to China by way either of Sining or Bhatang, but eventually he was obliged to return to India by the road he came, finally leaving Lhasa on the 19th of April 1812.

Thomas Manning was the last Englishman who ever entered Great Tibet, and only two Europeans have since been at Lhasa, namely, the Abbé Huc and Gabet in 1846. Manning's journey shows that, even after the Chinese campaign of 1792, Europeans could pass from Bengal, through Bhutan, to Lhasa, and that the difficulty of recovering the ground gained by Warren Hastings and Bogle is not insuperable. But since 1812 the work has been confined to enquiries and to visiting the heads of passes, so far as Englishmen are concerned. Csoma de Körös did much valuable service in this way. Mr. Hodgson, during his long residence at Kathmandu, collected a mass of information respecting the geography, ethnology, trade, languages, and literature of Tibet. Captain Pemberton, during his mission to Bhutan, in 1838, and Mr. Eden in 1864 made further additions to our knowledge, which has been still more recently extended by the investigations of Mr. Edgar. But the list of those who have actually reached the head of the passes leading to that forbidden land, which was formerly explored by Bogle, Turner, and Manning, is very brief. First among them are Dr. Hooker, the President of the Royal Society, and the late Dr. Campbell who reached the Donkia Pass (18,500 feet above the sea) and the Kongra-lama Pass, leading from the head of the Tista Valley, in Sikkim, to Tibet, in 1849. Dr. Hooker also visited two passes leading from Nepal. In 1870 Captain Chamer went as far as the Donkia Pass, and in 1871 our associate, Mr. Blanford, accompanied by Captain Elwes, explored the passes leading from Sikkim to the Chumbi Valley, and visited those of Donkia and Kongra-lama leading to Tibet. But no one, since the return of Manning in 1812, has ever reached the Pari-jong, at the head of the Chumbi Valley, the pass most used and most practicable, and by which all the three English explorers entered Tibet.

This total cessation of intercourse, either diplomatic or through English travellers, gives the arrangements of Colonel Montgomerie for exploring Tibet by the agency of natives an importance which can scarcely be over-estimated. Three journeys of Colonel Montgomerie's Great Tibetan emissaries have been completed, and the results worked out, and one, that of the Pundit of 1865, has already been discussed at one of our meetings. This explorer traversed the Nepal pass of Kirong, first sighted the Tsang-po at Tadum Gumpa, and travelled down its valley to Lhasa. At Talla Lobrong, the Pundit found the height of the Tsang-po Valley to be 14,187 feet above the sea; at Shigatze, 11,822, so that there is a rapid descent. From Janglache, an important place on the Tsang-po (or Narichu) mentioned by Bogle, to Shigatze, a distance of 85 miles, merchants and their goods

are conveyed down the river in boats. The Pundit also describes the Yamdok-chu (Palti) Lake, visited by Manning, as being 45 miles round, but only two or three wide, because it encircles a large island with hills, rising 2000 or 3000 feet above its surface, as delineated on D'Anville's map. But the Pundit, in contradiction to Manning, says that the water is sweet. The Pundit was at Lhasa from January to April 1866, and fixed its height at 11,500 feet above the sea. On his return he traversed the whole length of the valley of the Tsang-po from Chusuljong (11,300 feet) to Tadun (14,187 feet), and thence 140 miles higher up to the Marian-la Pass, which separates Tsang from Ari, or Great Tibet from Little Tibet.

Colonel Montgomerie's second Tibetan explorer set out in 1871. He crossed a pass in Eastern Nepal, called Tipta-la (Wallangchoom), which had been visited by Dr. Hooker in 1848, reached the Arun River, a tributary of the Kosi, and, after traversing two other passes, discovered a large lake, 20 miles long by 16, called Chuntodong, 14,700 feet above the sea, which he mentions as part of the boundary between Sikkim and Tibet. He then crossed the Lagulung Pass (16,200 feet), over the inner Himalayan range, and reached Shigatze. All this was new work, but the most interesting part of the journey was that from Shigatze back into Nepal, when he crossed the great plain of Tengri-maidan (13,860 feet), where the Nepalese were defeated by the Chinese army in 1792. Thence he followed a trade-route down the Butia Kosi, through a fearful gorge. The road crosses the river no less than fifteen times, three by iron suspension bridges, and eleven by wooden bridges, 24 to 60 paces long. At one place the sides of the gigantic chasm were so close that a bridge of 24 paces would span it. Along the perpendicular wall of rock a path is supported on iron pegs let into the face of the rock. The path is of stone slabs covered with earth, only 18 inches wide, a third of a mile long, and 1500 feet above the roaring torrent. Such are the stupendous difficulties which have been overcome in establishing communication between Nepal and Tibet.

The third explorer, a young Tibetan who had been thoroughly trained for the work, was despatched by Colonel Montgomerie in 1871 to explore the unknown regions north of the Tibetan watershed of the Upper Brahmaputra or Tsang-po. He reached Shigatze in November, and, having purchased fifty sheep to carry the baggage, he crossed the Tsang-po at the point where Mr. Bogle had been ferried over in 1774, and followed Mr. Bogle's route to Namling, on the right bank of the Shiang-chu River. It is interesting to find that, on more than one point the long-forgotten journal of Mr. Bogle furnishes evidence of the accuracy of Colonel Montgomerie's exploring. Thus the Chom-gompa, where, according to the explorer, there are 100 nuns, is in the very spot where Bogle stopped with the Teshu Lama, and was visited by nuns.

The explorer advanced north from Namling with the intention of crossing the range called by Hodgson the Nyenchhen-thánglá, and of exploring the great Namcho Lake—the Tengri-nor of D'Anville and the Chinese surveyors. The range was crossed by the Khalamba-la Pass, 17,200 feet above the sea, on the 8th of January 1872. In this mountain range there are numerous hot springs, and two geysers which throw up jets of water to heights exceeding 60 feet.

The water in falling again freezes, and forms pillars of ice up to the full height of the jet. These pillars are 30 feet in circumference, and the water within them, which is thrown up with great noise and violence, stood at a temperature of 183° , the boiling-point at that elevation being only $183^{\circ} 75'$.

The great lake to the north of the mountain range is called Namcho or the "Sky Lake" (Tengri-nor of our maps), and was found to be 50 miles in length by from 16 to 35 miles broad. To the south it is bounded by the Nyenchhen-thánglá range, consisting of snowy peaks flanked by large glaciers, and culminating in the magnificent peak of Nyenchhen-thánglá which is probably more than 25,000 feet above the level of the sea. The range was traced for more than 150 miles, running in a north-easterly direction. To the north of the lake the mountains are not so high. Between the Nyenchhen-thánglá and the Kuen-lun ranges, the lofty plateaux are inhabited by nomadic tribes and bands of robbers; there is no cultivation, and the monasteries are the only fixed habitations. The drainage is into the salt lakes at the lowest levels of this region, the chief of which is the Namcho or Tengri-nor.

The Namcho Lake is considered sacred, and although at such a very great distance from inhabited districts, and at so great an elevation above the sea, there are several permanent Buddhist monasteries on its banks and on islands, which are visited by large numbers of pilgrims. The lake is 15,500 feet above the level of the sea.

The explorer, making the monastery of Dorkia, on the western shore, his head-quarters, made the complete circuit of the lake, and found that it had no outlet. The largest influent is the Nai-chu, a very large stream coming from the east, about 40 paces across near the mouth.

After returning to Dorkia, the explorer once more set out on the 11th of February 1872, and a few days afterwards he made a short excursion to the northward, and discovered another small lake called Balcho. But on the 18th, as the travellers were about to start, a band of sixty armed robbers arrived on horseback, and, in spite of their entreaties, took away all their clothes and provisions, leaving them nothing but the instruments. After much begging, the robbers gave them back a piece of cloth each, with two sheep and two bags of food, but added that if they gave any more trouble they would be killed. The explorer had intended to have made his way from the Namcho Lake to China, but after the robbery he was obliged to march as quickly as possible in the direction of Lhasa, where they were likely to get into inhabited ground soonest. After suffering many privations, the explorer recrossed the mountains by the Dhok-la Pass, and reached Lhasa on the 9th of March, whence, after a long and difficult journey, he returned to the head-quarters of the Great Trigonometrical Survey. His route survey extends over 320 miles of a hitherto entirely unknown country, the chief discoveries being the position, size, and elevation of the great Namcho Lake, and the height and direction of the Nyenchhen-thánglá range.

Thus, through the labours of these three brave and intelligent native explorers, Colonel Montgomerie has furnished us with exact geographical knowledge respecting three of the passes between Nepal and Tibet,

of Kirong, the Butia Kosi, and Tipta-la: respecting the whole valley of the Tsang-po from the Marian-la Pass to Chasul-jong; the famous lake of Palti or Yamdok-chu; the position of Lhasa; the great chain forming the northern boundary of the basin of the Upper Brahmaputra; the Namchu Lake, and the interior drainage of Northern Tibet.

This information, combined with the investigations of Hodgson and others, and the personal observations of Bogle, Turner, and Manning, enable us to form a sufficiently accurate idea of the trade-routes leading from India to Great Tibet, up the gorges of Bhutan, Sikkim, and Nepal; and of the physical features of the great plateau in rear of the Himalayan ranges.

Commencing from the east, the first trade-route is through the country of the Towang Bhuteas, who are directly subject to Lhasa, down to Udalgori in Assam. Next we are told by Captain Pemberton, who traversed nearly the whole of Bhutan from east to west in 1838, that there are several passes leading from Tibet into the valley of the Manass, the traders finding their way to Dewangerie at the foot of the hills, and afterwards repairing to a great annual fair at Hazu, opposite Gowhatty in Assam. Then comes the pass of Pari-jong, by which Bogle, Turner, and Manning, found their way from Bhutan into Tibet, and whence Tibetan traders proceeded by Paro and the Baxa Dúar to the fair established by Mr. Bogle at Rangpúr. Here duties were abolished, and buildings were erected for the convenience of the merchants, as well as of their animals and goods, the annual cost to Government being only 70*l*. The Bhutan caravans arrived in February and March at Rangpúr, returning in May and June. They were thus attracted to Rangpúr in great numbers, and the excellent arrangements for the benefit of trade which were made by Mr. Bogle, continued for half a century after his untimely death. But Bogle's arrangements were neglected, and since 1834, when the Government aid was discontinued, the Rangpúr trade has almost entirely ceased. At the Assam fairs gold dust, salt, musk, cowtails, woollens, and horses are exchanged for lac, madder, silk, cloth, and dried fish.

The eastern Sikkim passes leading into the Chumbi Valley, called Jelep-la, Guatin-la, Yak-la, and Cho-la, have recently been examined by Mr. Blanford and Mr. Edgar. They are rarely interrupted by snow for many days, and form an alternative route to that through Bhutan, up the Chumbi Valley to Pari-jong. Further north is the Tankrala Pass, 16,083 feet above the sea, which is the most snowy pass in Sikkim, and the most difficult of access. The Donkia-la, at the head of the eastern branch of the Tista, is 18,466 feet above the sea, and the Kongra-lama Pass, at the head of the western branch, is lower (15,745 feet). They are used by Tibetan herdsmen, who bring their cattle to graze in Sikkim, and by the people in the upper valley of the Tista branches, the Lachin and Lachung, who twice a year carry wood into Tibet, and bring back loads of salt in return.

The passes from Nepal into Great Tibet follow the tributaries of the Kosi River. The two easternmost were visited by Dr. Hooker, and one, the Tipta-la, was crossed by Colonel Montgomerie's second explorer. The more westerly pass, by the Butia Kosi, was used by the same explorer on his return to India through Nepal. Its appalling difficulties have already

been alluded to. This is not the route adopted by the Chinese army in 1792, when it advanced upon Kathmandu. The official route is easier, and passes by Kirong to the westward; while merchants are forced to use the more difficult Tipta-la.

Once the intercourse between Bengal and Tibet, by means of these passes, was frequent; and it should certainly be the aim of our rulers to restore it. The Tibetans have always shown themselves desirous to promote such intercourse; and there is certainly no reason why the policy of permitting the passes to be closed through the jealous and selfish exclusiveness of the Chinese Government should be continued. Bogle enumerated the products of Great Tibet as consisting of gold, musk, cowtails, wool, and salt. He said that the genius of the Tibetan Government was favourable to commerce, and that no duties were levied on goods, so that, in his time, many foreign merchants had settled in Tibet. Cashmirian traders had establishments at Lhasa, and all the principal towns of the country; and the Gosains, or trading pilgrims of India, resorted to Tibet in large numbers. Their trade was confined to articles of great value and small bulk, and they travelled without ostentation, and often by paths unfrequented by other merchants. The Kalmuks annually came to pay their devotions to the Lamas, bringing camels laden with the furs and hides of Siberia. The Bhuteas brought the products of Bengal and Assam, while the Chinese had established themselves in great numbers at Lhasa, and carried on a lucrative trade in the teas, porcelains, and brocades of their native country. The merchants of Bengal and Bahar sent their goods by the passes of Nepal and Bhutan. They consisted of broad-cloth, indigo, pearls, coral, chank, spices, tobacco, sugar, white cloths, satins, and the returns were in gold, cowtails, and musk. It was this trade which Warren Hastings did so much to foster, and which Bogle, as collector of Rangpúr, encouraged by the establishment of a fair, and the grant of privileges and immunities.

But all the ground gained by these able administrators in the last century has since been lost. Mr. Edgar, the Deputy Commissioner of Darjiling, tells us a very different story in 1874. Owing to the difficulty and insecurity of the roads, the trade between China and Tibet is now much less considerable than was formerly the case. The chief article is tea, of a coarse description and unpleasant flavour, which sells at Lhasa for eight annas the pound; and so totally have the English neglected the Tibetan markets, that actually Chinese tea is imported through Tibet into the British district of Sikkim for the use of the inhabitants, although tea is grown on the spot. European and Indian goods mainly reach Tibet through Nepal and Ladak, and consist of breadcloth, cottons, coral, pearls, tobacco, opium, and some rich stuffs. The exports from Tibet by these channels are blankets, musk, cowtails, borax, ponies, gold, and silver. There is also some local trade with Sikkim and Bhutan. The great wealth of Tibet lies in its flocks and herds; and enormous quantities of wool and ghee might be imported into Bengal at cheap rates, if a good practicable pass was once opened. The route proposed by Mr. Edgar is by a bridge across the Tista in Sikkim, and a road thence to the Cho-la range.

My object in the present paper has been to call

attention to the valuable results of the journeys of Mr. Bogle and Mr. Manning, which have only now been brought to light, and to give a brief account of the recent labours and discoveries of Colonel Montgomerie's explorers in Great Tibet. These narratives embrace part of a very important subject, namely, that of the re-establishment of friendly commercial intercourse between Tibet and Bengal, a subject which will most assuredly receive attention in the near future. One thing is certain that any steps that may be taken to open diplomatic intercourse with the Teshu and the Dalai Lamas, or to promote trade through the Himalayan passes, cannot fail to add to our stock of geographical knowledge.

CLEMENTS R. MARKHAM.

AUGUSTUS MARGARY.

MR. AUGUSTUS MARGARY, with whose treacherous murder on the borders of Yunnan and Burma our readers are now only too well acquainted, was a son of General Margary, late of the Bombay Engineers. He entered the consular service of China in 1867, as a student interpreter in the Legation at Peking, and was shortly afterwards promoted to the rank of consular assistant, and transferred to one of the open ports on the coast. In 1870 he was appointed to the consulate on the island of Formosa, and after a short period of service at the head office was given charge of the port of Kee-lung, one of the branches of the Formosa consulate, and situated on the north-east coast of the island.

It was here, during the summer of the following year, that Mr. Margary, in company with his friend Mr. John Dodd, distinguished himself by saving the lives of a number of seamen wrecked upon the coast. Three European vessels had been driven on the rocks near the mouth of the harbour during one of those terrible cyclones that almost annually visit the Formosa shore; no boat could communicate with them, but Mr. Margary and Mr. Dodd nevertheless succeeded in swimming off to them with lines, and thus saved the whole, or nearly the whole, of the crews of each vessel in succession. For this gallant action, both were rewarded with the Royal Humane Society's medal and with the "Albert" medal, and it was the feeling of those who from living near the scene knew the circumstances of the case best, that these high distinctions were never more worthily bestowed.

In the autumn of 1874, when the Government of India requested Her Majesty's Minister at Peking to appoint an officer of the consular service to act as Chinese interpreter to the expedition then being organized to explore the trade-routes between Burma and China, Mr. Wade selected Mr. Margary for the service, and in order to prepare the way for the expedition with the officials along the road to be followed, he sent Mr. Margary overland to Burma to meet it, instead of by the sea route *via* Singapore, to join it at Rangoon. In this way Mr. Margary had an opportunity of performing one of the most important journeys of modern days, and in doing so of displaying qualifications that stamped him at once as a competent traveller and an able diplomatic officer. He started from Shanghai on his lonely travels towards the end of August 1874, and after ascending the

Yangtsé as high as the Tung-ting Lake, traversed successively the provinces of Hunan, Kwei-chau, and Yunnan, and arrived at Bamó, in Upper Burma, on the 16th of January 1875. He had passed through the scene of the Mian-tse war in Kwei-chau, and of the Muhammadan or Panthay war in Yunnan, and had succeeded everywhere in establishing friendly relations with both the officials and people of the country. That a complicated and deep-laid scheme of treachery was at the time of his arrival in Burma being secretly planned, in quarters with which he was not concerned, for the destruction of the expedition he was to join, he could, of course, know nothing, and that he remained in ignorance of it till the last, detracts not one whit from the honour due to his memory, for what he had already accomplished; whilst having subsequently fallen a victim to—as it were—his own success, is the best proof of the completeness of that success and of the dastardly nature of the plot that had been laid.

This is not the place to give details of his journey, but his journals up to the time of his arrival at the frontier of Burma having been saved, these will in due time be given to the public, and will speak for themselves.

The particulars of his death, or rather his butchery, have not as yet been made clear. On the passage through the Kakhyen Hills from Bamó towards the Chinese frontier, rumours from time to time reached the expeditionary party of danger ahead, when Mr. Margary, full of confidence in his previous successful negotiations, and his thorough knowledge of the language and character of the people, volunteered to go forward alone and ascertain the truth or otherwise of these reports, and endeavour to allay any suspicions that might have gained ground as to the objects of the expedition. When one march ahead of the party, he wrote back to report all clear, and the same evening (19th February) arrived at the Chinese border town of Manwain, where he had previously been hospitably received. The next news of him was an intimation from some Burmese at Manwain, that on the 21st he had been cut down from behind, in a street of that town, by a party of Chinese, that his five attendants had been massacred at the temple in which they lodged, and that the heads of all had been stuck upon the town walls as a public notification of the grandeur of the deed.

That the service to which Mr. Margary belonged has lost a valuable officer, and the Geographical Society one of its most accomplished members, are facts that require no further testimony than a record of his deeds. The loss to his friends and companions of a nature such as his was, is less easily described, and the ordinary platitudes with which the dead are usually honoured in public notices utterly fail to convey the feelings aroused in any one who knew him well. Dramatists and novelists have seldom succeeded in portraying character, combining qualities of manliness and general worth such as those the private friends of Augustus Margary were wont to acknowledge he possessed. He was one of nature's noblemen!

X.

INDIAN FAMINES.—No. II.

THE long-expected minute by the Government of India on the late famine in Bengal, dated the 26th of February 1875, was published by the *Homeward Mail* on the 22nd of March. The minute is, like its subject, shorter than was anticipated. We expected it to begin at the beginning, to tell us of the failure of rain in June, July, and August 1873; of the measures taken all through those months to ascertain the quantity of food in the afflicted districts, and of the steps taken to meet deficiencies then and for the future. Our expectations have been disappointed. The minute refers to reports from the governments of the respective provinces, and to the report from the Government of India, 7th November 1873, telling the Secretary of State that "every available means, at whatever cost," would be used to save life. We all know that the result was a great success. We are now told that "the total net cost will not exceed the sum of 6,500,000."

In the rest of the minute, mixed up with "some general observations for future guidance . . . parts of the history of the past year" are incidentally met with. The resolution of the Government of India of the 7th of November 1873, embraced the chief subjects, and it is shown that the food supply, or stock in hand, had not been sufficiently attended to. "The stock of food in the hands of the people turned out to be larger than was anticipated," while the production of food "was further increased by the unusual quantity of rain" in 1874. "A balance of about 100,000 tons of rice remained after the relief operations had been concluded . . . The responsibility for this excess rests entirely with the Government of India. If a substantial reserve had not been provided, the success of the relief operations would probably have been attributed rather to good fortune than to foresight." We have already seen that ignorance of the food stock, and an unexpected season, accounted for the balance, but not content with these explanations, a little more is now offered. "In the beginning of September 1874 very great apprehensions were felt that the scarcity would be prolonged. This was only averted by a fall of rain at the very last moment" for sowing the winter crops. "If the rain had not then fallen, the rice in reserve would have been urgently required." Of course it would have been required if other food had not been found at a cheaper rate; but food was found, the seasons aided its production, and the writer of the minute forgot to say that the Government rice was bitter by the exaction of more labour. One action of foresight, one of the seasons, and one of sheer ignorance, produced the balance out of the reserve. The explanation of the foresight is a hasty one.

"The total quantity of grain purchased by the Government amounted to 479,696 tons. . . . The total quantity of food-grain carried into the distressed districts can hardly have been much less than 1,000,000 tons. It is at all times unsatisfactory to manipulate uncertain figures. We cannot be precise with those before us. The smallest moiety was supplied by Government at a net cost of about 65,000,000 rupees, from other sources the gross expenditure was about 91,770,000 rupees; the difference, 2,677,000, has been, or will be recovered. We have no estimate of the value of the labour

given in return for food, but the greater moiety brought to the famished districts by private trade was a remunerating transaction: the traders fed those who could, Government fed those who could not pay. We hope to see in time some estimate of the value of work done, when some food calculations "and others which are likely to be valuable hereafter are elaborated by the Government of Bengal."

The large exports of food from Upper India, amounting to some "289,000 tons, . . . did not greatly affect prices in the producing districts," but the "return of the quantities of food-grains exported by sea from Bengal during the year ending on September the 30th, 1874, shows that the exports were diminished by about one half, owing to the rise in prices." Any rise in the price of food is against the comfort of consumers, so we ask why prices rose in one place more than in the other? The minute gives us the answer. "It was found better to buy by private arrangement with merchants, rather than that the Government should appear openly in the market. The limited experiments, made in the latter direction, showed that the public action of the Government produced an effect upon prices quite out of proportion to the actual amount of the transactions." The times are changed since our merchant forefathers bought and sold to the profit of their company; all was novel in 1874. There were difficulties to contend with, for "Government had for the time to fulfil the functions of both wholesale and retail dealers;" the step retrograde was not satisfactory. In reference to the policy adopted we find, "It is only where there is a great deficiency—and there is also good reason to believe that the traders will be unable to meet the deficiency—that it is right for the state to intervene for the purpose of supplementing the general food supply. . . . During the past year there can be no reasonable doubt that the measure was imperatively required in order to prevent a very great mortality;" the Government hope that "being called on to interfere in this manner with the functions of trade will diminish" with the extension of railways.

The question of carriage requires a brief notice. It is said that the "carts of the country were not available for ordinary traders in any quantities," but "the manner in which grain was conveyed from the railways to the places where it was required has afforded a remarkable instance of the great resources of the country in wheeled conveyance." We have not sufficient data before us to follow this subject out to its legitimate conclusion, but we have enough for the occasion.

Between September and November 1873 some 200,000 tons of food were exported from the vicinity of the distressed districts. The *Times* has said that this was going on at the same moment as the import by Government; there was therefore carriage in the locality for that quantity. During the course of the famine, traders imported more than 500,000 tons; so that they had carriage for that quantity. 1,000,000 tons in all were imported, of which 900,000 tons were used. If the 200,000 tons had not gone, the carriage available to the traders would have sufficed for 700,000 tons in periods scattered over the whole scarce time, and thus the whole 900,000 tons might have been in the distressed districts, without any effort from the Government, except that required for a knowledge of its duties.

In paragraphs 9 and 10 a greater attention is directed to these duties for the future, but how a famine was

admitted as a fact without any knowledge of the stock of food in the hands of the people, and without any certainty as to the means of importation of food, is a question for history to unravel. Government accepted the fact, and fed its population: it has accepted the responsibility of a reserve supply of food, but it is not forgotten that Lord Salisbury said in his speech (House of Lords, April 24th, 1874), "We pressed him (the Viceroy) earnestly to increase his stores."—*Mail*, 27th April 1874. They were increased from 420,000 to 479,696. The seasons, the departure of those seeking relief, and the quantity of food poured into the country by the native trade left a considerable balance on hand: the calculation was sound, but events over which the Viceroy had no control altered the circumstances of the case. These events have led us back to the Duke of Argyll, who told the House of Lords "that there is no country in which greater energy is shown by private traders than in India." We again repeat what we have said before, that under proper management these traders are equal to all occasions of local failures of food; every ryot is more or less a supporter of some food dealers, their interests are the same, and it ought to be only in general failures of rain, and a general deficiency of the stocks of food in hand, that a Government like that of India should undertake to feed a nation. There is plenty of waste land in the East, there are people without occupation, there are some to be rewarded for what they have done; are there no enams for them? Leases of land for ten, twenty, or fifty years were once the fashion in India; great jungles were reclaimed, many mouths were fed, and population increased. If idleness is encouraged as it has now been, if confidence is not placed in the food-dealers, who have brought the people into their present condition, there will some day be a sudden decrease either of the ruled or the rulers.

H. P. MALET.

GARDEN OF TRANSMIGRATED SOULS.

THERE is a very curious and graphic passage in the *Travels of Friar Odoric in China* (circa A.D. 1324) regarding a sight that he was taken to see as one of the lions of the great city of Kingszé or Hangchau, and before saying more on the subject it will be well to transcribe the passage:—

"This (Cansay) is the Royal City in which the King of Manzi formerly dwelt. And four of our friars that were in that city had converted a man that was in authority there, in whose house I was entertained. And he said to me one day—'Atha * (which is to say *Father*), wilt thou come and see the place?' And when I said that I would willingly go, we got into a boat, and went to a certain great monastery of the people of the country [which was called Thebe]. And he called to him one of their monks, saying—'Seest thou here this *Franki Rabban* (which meaneth this Frank monk)? He cometh from where the sun sets, and goeth now to Cambaliéch to pray for the life of the great khan. Show him, therefore, prithee, something worth seeing, so that, if he get back to his own country, he may be able to say—I have seen such and such strange things in Cansay!' And the monk replied that he would do so with pleasure.

* No doubt the Turki word *Atha*, *Father*, used also as a term of respect. Thus Ibn Batuta mentions that Uzbek Khan, of Sarai, attending the Friday prayer, saluted the shérif as "*Atha*" (II., 410).

"So he took two great buckets full of scraps from the table, and opening the door of a certain shrubby which was there, we went therein. Now, in this shrubbery there is a little hill covered with pleasant trees [and all full of grottoes]. And as we stood there he took a gong, and began to beat upon it, and at the sound, a multitude of animals of divers kinds began to come down from the hills, such as apes, monkeys, and many other animals, having faces like men, to the number of some three thousand, and took up their places round about him in regular ranks. And when they were thus ranged round about him, he put down the vessels before them, and fed them as fast as he was able. And when they had been fed, he began again to beat the gong, and all returned to their retreats. So I, laughing heartily, began to say—'Tell me, prithee, what this meaneth?' And he answered—'These animals be the souls of gentlemen, which we feed in this fashion for the love of God!' 'But,' quoth I, —'No souls be these, but brute beasts of sundry kinds.' And he said—'No, forsooth, they be nought else but the souls of gentlemen. For if a man be noble, his soul entereth the form of one of these noble animals; but the souls of boors enter the forms of baser animals, and dwell therein.' And say what I list against it, nought else would he believe" (*Cathay*, &c., pp. 118—120)

That Odoric did not invent this sight is proved by the incidental remark of another traveller some twenty years later—John Marignolli—who says (*Ibid*, p. 384):—

"There are also certain animals, with countenances almost like a man's, more particularly in the possession of the Queen of Saba, and in the cloister at Campsay, in that most famous monastery where they keep so many monstrous animals, which they believe to be the souls of the departed."

Some time ago I received from a most kind correspondent at Hangchau (the Rev. G. E. Moule, of the Church Mission there), sundry maps and valuable notes in correction and augmentation of my attempt to elucidate Marco Polo's notices of this great city. In one of the maps, which showed the lake (*Si-hu*) to the west of Hangchau, with the numerous convents and other buildings on the hills encompassing it, one locality was marked as the "Lin-yin Convent, with Buddhist monuments of the 10th century," and closely adjoining this the "Fei-lai-foong or Peak of Sculptured Caves." In writing to thank Mr. Moule for his valuable communications, I told Friar Odoric's story, and pointed to this Peak of Sculptured Caves as a possible site for it, with an enquiry.

Mr. Moule has been good enough to take the trouble, in the midst of his serious duties, to answer my questions, and I extract the following passages from his letter.

H. YULE.

"EXTRACT FROM THE SI-HU-CHE [*Topography of the Western Lake*], Sect. vi., fol. 19.

"Apes'-call-Grotto, at the foot of Fei-lai Hill. This grotto has a passage leading all the way to *T'ian-chuh* (India).* Under the Sung† there was a monk called Che-yih, good at whistling, who used to keep apes among the hills. When he went down to the stream and gave a long whistle, every one of the apes would assemble. They called him 'Father of Apes.'

"Fei-lai Hill is a rocky hill perhaps 80 to 100 feet above the plain, within the precincts of Linyin Convent, one of the most famous of those among the hills west of

the Si-hu. The convent is said to have been built early in the Sung period, by a monk from India, who, walking there with his white ape, thought the place so much like his home in India that he called it after his old convent, *Lin-tsiu* ('Spirit Eagle'), changed afterwards to Lin-yin ('Spirit Retreat'), and vowed that the grottoed rock must have 'flown hither' (*Fei-lai*) from India. It is added that the ape thought so too! Whether this means that he betook himself naturally to the peaks and caverns, I do not know. It is certain that there is a strong flavour of apes about the traditional notices and poetical quotations which make up most of the topographical chapter on this Lin-yin convent. Only the other day a monk told me that the apes had been seen on the rocks within this twelvemonth. No animals are now kept there except a few goats. There are plenty of squirrels in the trees. The great emporium of animals privileged on Buddhist (transmigration) principles, is further off, at 'Cloud-Lodge-Convent' (*Yun-tsi-She*), where cattle, swine, &c., are offered by devotees, and fed by the monks in privileged idleness.

"I cannot hear that apes or any other wild animals are treated in this way. Nor can I find 'poor gentlemen,' or metempsychosis, in any form to be specially connected with the apes either of tradition or of the present time. At one of the chief convents in this province, three days' journey from hence (*T'ian Muh*, 'Eye of Heaven' Convent), there are said to be many apes or monkeys, wild and somewhat formidable.

"For the rest, I think Lin-yin and the Fei-lai Hill probably were the object of Odoric's excursion, since, though not on the lake shores, they are often visited by crossing the lake, and walking thence 1 or 2 miles through the woodland. 'What *Thebe* is I cannot tell. If Odoric wrote badly is it possibly *Phit-lé* = Fei-lai?"

G. E. M.

"I rendered your extract into Chinese for my teacher's benefit, and to his great amusement.

"For the love of God,' is of course the Frank monk's view of the case, projected by him upon his atheistic Buddhist brother.

"The 'release of animals' (*fang-sheng*) is, I think, meritorious in a Chinaman's eyes, not so much from any *present thought* of metempsychosis, as because of the commandment based upon it:—'Take no life.' It may have been otherwise in the days of Odoric.

"The grottoed hill, *Fei-lai-fung*, is a very good scene for the story, except that the caves are hardly large enough for quite so large an assembly as 3000. It stands over against the main entrance to the Lin-yin Convent courts, a wide, paved road overhung with oaks, planes, &c., intervening. On the road-side next the hill is a square tiled pavilion, with stone seats, overlooking a square tank of pure water, inhabited by water-tortoises and fish, a clear stream feeding it, and issuing below, by an unseen fissure in the solid limestone, in a bright little cascade, which with the floods of ages has chafed and polished the roots of the Fei-lai Rock above it.

"You cross this with a stride, for it is a mere brook in ordinary weather, or, if you please, by a pretty stone bridge below, carrying a tiled pavilion, and are in the 'shrubby.' At present this is sufficiently wild, though very pretty—trees and shrubs of many kinds, pines, evergreen oak, maple, plane, azalea, syringa, &c., springing from the soil in the crannies of the rocky hill, in very picturesque confusion.

"The rock, both outside and in the caverns, is fretted everywhere with figures in high relief, some of giant size, some diminutive, being apparently Buddhs, Arhats, and some Brahminic deities and demons. These are, many of them, well done after the Chinese taste, and are said to be the work of the Sung times.

"The only tenants of the grottoes now to my knowledge are huge bats, as large as rabbits. A few days ago [as mentioned above] a monk told me an ape had been seen this year; but his description is hazy."

* Or possibly, though the Chinese is against it, only the *Convent* of India, 2 miles off.

† The Sung dynasty ended with the conquest by Kublai Khan, A. D. 1278.

THE NEW STATE OF COLORADO.

DURING four months of the past summer I made a horseback ride through the most attractive regions of this, the thirty-eighth state of the Union, accompanying Dr. Hayden on his expedition, and the doctor personally on his sub-expedition to the Elk Mountains. This eminent explorer had invited me, as the representative of the Society, to go with him to see in what manner and with what results he conducted exploration in the great West.

The heart of America is a vast mountainous region, comprising the territories of Wyoming, Utah, Arizona, New Mexico, and Colorado—one-eighth of the territorial domain of the United States. Indians, Aztecs, and Spaniards are the only races of men who have left their traces on this region; and the ruins which mark their ancient habitations are quite as mysterious as those which, from year to year, are being excavated along the banks of the Nile. The population comprises 340,000 whites and Indians, the latter reaching as high a figure as 50,000. With the exception of the Mormons, who settled on the shores of Salt Lake in 1847, to escape persecution and enjoy their peculiar institutions, and the relics of the old Spanish settlements, the whites are either emigrants from the old world, adventurers in search of gold, invalids repairing shattered constitutions, Eastern farmers tilling a more fertile soil, and raising richer breeds of stock than are found on our slope, or social outlaws from the Atlantic seaboard. The nationalities preserve their native marks. The Jew is the same diligent, sober money-getter we see about the Bourse of Vienna; the Frenchman opens a restaurant, and flings out a sign, "Del-mónico of the West," or "Maison Dorée," and is ever a worthy component part of the new community; the German loses a little of his fatherland stolidity, and now and then catches a breeze of the enthusiasm constantly blowing there; the Irishman, who is not generally of the higher type, exhibits both the aggressive and kindly characteristics of his race; while the American takes chances in everything, from political power to blacking boots, changing his occupation according to the shifting phases of fortune. There is not in this compound body politic any pronounced religious fervour in any direction. Churches there are, but they find stronger support in the gentler sex than among the busy men, whose lives are devoted to unflagging industry in secular pursuits. The Jesuit fathers have done noble work among the Indians, but, like all spiritual labour among aboriginal races, permanent effect could not be secured without abundant and continuous material generosity. The typical Indian is as far removed from the pen-creation of Cooper as the Italian lazzarone is from our conception of the Roman gladiator. He is in no sense a hero; there is not a particle of epic "stuff" in him, whether he be a Cochise or a Colarow. Ages ago he may have belonged to the nobler races of men, but such is not the fact now. As he exists at the heart of the continent, he is a dependant on the Government, clad in the ludicrous costumes furnished by civilization, retaining an indifferent regard for the traditional habits of his ancestors. Fidelity, except in individual instances, is rare; of ambition there is none. The Indians simply crave supplies, pass their aimless lives awaiting death, which generally comes to them through

that terrible Indian destroyer—rheumatism. While strongly reprobating the inhumanity of the settlers towards, and the needless cruelties which they have sometimes suffered from the soldiery, their only usefulness to themselves and their surroundings can be found in stern treatment from a practical standpoint.

The state of Colorado had, at the time of my visit, 624 miles of railway which, by the end of 1874, was to have increased to 1168. Since 1871 the public wealth has augmented from \$20,000,000 to \$70,000,000. There are 200,000 acres under cultivation, and in addition to this it is considered the richest state in the union in iron and coal. Here I found that the younger women not only ride whenever practicable, but generally adopt the manner of the man. The climate, the waggon roads and rails, the high-bred and alert horses, to say nothing of the mules, all favour the woman as an equestrienne. No spirit of emulation is so keen among the young ladies as in a race for the lead or a dash for a prize. They glow with excitement and anticipated pleasure, at the very mention of horseback riding; and I do not know that even English ladies excel them in their love for this healthy exercise. In what charming contrast is this taste with the indoor, parlour recreations of the American young ladies of the Eastern States. In Colorado, among the fair sex, alluring luxuries have not yet seduced them from the hardest and noblest of Saxon pleasures. In this it must be allowed there is a fine harbinger for the future. Profound students of Sociology have told us of the constantly diminishing stature of the French; those who have examined the brief existence of the mixed race in North America, have traced the gradual growth of all manner of constitutional disease, attributable to wrong-living and lavish mental exertion. None of this decay can be observed among those who carried good health to the territories flanked by the Rocky Mountains; instead, there is added strength and power. The proof is in the children. They are uniformly healthy, and, curious fact, are uniformly blonde, regardless of the complexion of their progenitors. These little ones are rotund of figure, with a soberer spirit than the Latin, a greater juvenile solidity than the Eastern child. To me, almost without exception, every child was a prime Saxon. Is it impossible that these flaxen-haired juveniles may not mature into a race as able in physique and as conservative in inclination as the barons of mediæval England? The mother is little perplexed there as to the future of her offspring.

The settler who arrives in Colorado from the East, taking advantage of the Homestead law, fences off 160 acres of land and secures a right to 160 more. He builds a comfortable two-story cabin, with five rooms, for \$500, and begins to buy stock at \$25 a head. Stock-raising and not farming is his business; and by industry in this branch, he will probably at the end of five years find himself in the possession of that which in cash is worth \$10,000. It should be understood that the land he holds by right of possession is not surveyed as yet by the Land Office, and hence his ranch, in fact, covers often thousands of acres. Every ranch is a hotel. The owner holds himself in readiness to house and feed the traveller at moderate rates, and this is no inconsiderable source of his revenue.

The park-plots of Warwickshire, and the fairest, wooded swards of Middlesex, could not be more im-

pressive and suggestive of a quieter, sublimer pastoral beauty than Burgen's Park. It lies just to westward of Pike's Peak—not a day's march beyond the Ute Pass—a high-walled cañon which leads into it. What a world of magnificent solitude there was around us! The huge forms of the noble trees, rising like shafts crowned with laurel capitals, were grouped in grove-like clusters over the rolling country; and here and there in the open could be seen the granite and precipitous face of Pike's Peak, mellowed with the hues of the rainbow. The sharp outlines of the Park range, the sullen retreat of the rain-cloud over the jagged summits, the unveiling of a soft and cheerful sky, were mere details of the scenic transformation, accompanied by the music of the swift streams. To call regions like this one a park, is a feeble bit of nomenclature. With nothing dismal, with none of the glamour of the Black Forest, there seemed a faultless arrangement of episode, a marvellous naturalness of landscape gardening, a variety and perfection of nature itself.

During my three months in the mountains, from the head of the expedition to the humblest attendant, I experienced the kindness and courtesy of all. Dr. Hayden I found an incessant worker, a daring mountain climber, and a genial companion. He is most beloved by his subordinates, for during seven successive years he had substantially the same attendants, all of whom had followed him through dangers and trials innumerable; and there, too, I found his chief executive officer, Mr. James Stevenson, who, on the upper Missouri, twenty years before, had united his fortunes with the Doctor's, and together they had since struggled on.

Two classes of consumptives visit Colorado—those in the incipient stages; those who are "too far gone." The first are invariably saved; the second are invariably lost. There might be a third division, embracing cases of doubtful malignity, and with them it may be said that the larger number are restored to a sound condition of health. There is but one great evil that menaces these unfortunate invalids. They go to Colorado, establish themselves for a brief period in a simple household, eat of the rich cream and cheeses and beeves, roam over the country on horseback, and gradually abandon stimulants. Soon they find their cheeks ruddier, their frames hardier, their arms and legs tougher; fatigue rarely supervenes hard physical exercise; the cough vanishes; their spirits become elastic—and it is all gone; the malady is extirpated in three months. So they think. Vague delusion! They hurry eastward; the business craving is again upon them; the ceaseless, life-destroying ambition to make money draws them back to relapse, which is not long delayed by the eastern climate; and then, if the patient sees that all is over, he lies down to die, or makes a second but, this time, fruitless journey to the West. *It is only the hereditary or confirmed consumptive who remains in Colorado for a term of years who is restored; and to this truth I never found an exception while riding through the most populous districts of the territory.*

To those who have made any examination of the sanitary qualities of Colorado, it seems a crime that these restorative blessings have not been more widely published to the world. To a few only have they been made known, and yet hundreds of lives have been saved. Emphatically the Land of Health, Col-

orado by no means confines all her remedial qualities to the cure of consumptives. It is, to speak at large, a place to go for repairs—to get your constitution mended, an overtaxed brain put at rest, an abused stomach renewed, a morbid tendency cut short. It is one of the evils of resorts for invalids or broken down men and women that there is no active employment. Different, indeed, is it in Colorado. When one gets on the highway to restoration, he craves labour and finds it—of the pastoral kind—everywhere.

Gold-hunting in the territories is a curious, ever-shifting, hardly describable pursuit. While in all countries subjected to the mining fever—Australia, New Zealand, Siberia, and South Africa—there is always a grave uncertainty as to the fate of an investment in "prospected" domains, there are yet laws and usages by which all that the soil or rocks yields may readily accrue to the rightful owners. West of the Mississippi we find another state of affairs. In some territories and communities where mining has gathered the dignity of a matured industry, organized effort undoubtedly reaps every advantage that belongs to priority of occupation; but even where this organized industry can show a generous income, the Eastern or non-professional investor rarely participates in the revenue. Let us glance at the method of a mine. "Texas Jim," having led a wild life in the plains, flourishing in the palmy days of Julesburg and Virginia City, when he was admired for the number of murders he committed, now having no further means of earning a livelihood, concludes he will become a "prospector." A "prospector" is a gold-hunter who has a single jackass, laden with 100 lbs. of provisions, a pick and shovel, and a gun. Thus provided, he starts into the Rocky Mountain ranges, on a three months' journey, turning over soil here and there, and disturbing granite from time to time. At last he strikes a "lode." He packs back to Denver, tells his story, exhibits his quartz, and sells out his right for a trifle, which sum is soon dissipated at the gaming-table. The "lode" now passes into other hands. A mining engineer is authorized to survey and fix the boundaries, and "claims" are duly recorded in keeping with the law. A stock concern is soon organized; the books are thrown open to subscription; pamphlets with maps on tinted paper are circulated; distinguished writers and wandering enthusiasts are entertained on the spot, and soon the mine of Swindler & Co. is the most wonderful magazine of wealth heard of in historic times. Then one of our citizens here in New York, having some capital unemployed, and his experience in those slow seven per cents. or unprofitable real property becoming tedious, thinks he will buy stock in the mine of Swindler & Co. He may lose—he knows that; but the chances are in favour of large gains. He places his money accordingly. Months roll on; highly favourable accounts are received; fresh indications of quartz are reported. The company must therefore expand to meet the emergency. It buys fresh machinery, and in order to do this call must be made on the stockholders. Now, the organizers and operators of the mine are at the "lode" itself. Without any honest intention of working a genuine and valuable mine they have actually found a rich deposit. Originally beginning with the intention to bleed Eastern capitalists, feather their own nests, and permit the bubble to burst when there would be no further need

for inflation, they have found out they own a pavement of gold. Their next step is to do what they call "freezing out" the investors. They argue "Here we are out here working this mine night and day, while this Eastern fellow has nothing to do but put his profits in the bank. We will freeze him out." They build more works, buy additional machinery, and thus assess the stockholder, until he is glad to sell out and rid himself of the whole concern. The property passes into the hands of the original operators. They have swindled valuable works out of the investors, and now probably own a lode worth several millions of dollars. Upon this they fatten to their heart's content. The mine may not always be a lode, it may be a gulch or a placer; and it may not always turn out to be a genuine lode, but only a surface indication. Where knavery has not obtained, ignorance has squandered, vast fortunes. How many instances can be mentioned where great mining establishments, many of them costing \$1,000,000 and upwards, have been built in our territories, upon the belief that underneath was an Ophir and El Dorado, and when the shafts have been sunk, not enough gold to pay the postage on an Eastern mail could be found. It is safe to say, therefore, that a man not on the scene, who invests in an American mine, is almost sure to become a victim. I do not believe that there are a dozen men in New York, having mining stocks in Western enterprises, who ever have or ever will receive dividends. Indeed, nine-tenths of this class of investors have been deliberately defrauded of their money. Many millions of dollars have been sunk in the territory of Colorado alone in this manner, and it is very doubtful if the gold actually obtained from American mines since 1849 will equal the capital invested to extract it. To be sure there are hundreds and thousands who have made fortunes in mining. Many gulches have yielded immense revenues, as Alder Gulch, in Montana, from which \$40,000,000 have been taken; but this sum has in the main been divided up among small and industrious miners, who however always cease their labours when they get enough money to indulge in a protracted spree. It is a part of their code that every good miner must get drunk. Their wages as hired help range from \$2.50 to \$6 a day; but when they work for themselves, if intelligent, they can earn more. In fact, this is the only way by which our Far-Western mines can be made profitable to honest effort and capital. If a man, intent upon making his fortune, buys an arastra and sits patiently down and crushes quartz, not dividing his time between labour and debauchery, as the majority do, it is a certainty that riches will eventually be his. All the territories are full of gold; it is only a question of patience, sobriety, honesty, and organization to gather it in quantities that will satisfy any one.

The extensive and wanton burning of the Rocky Mountain forests goes on from year to year. Perhaps the reckless miners and thoughtless travellers who are responsible for this prodigious waste, are not aware of their criminal acts, by which they bid fair to convert fertile valleys and copious river sources into arid deserts and dried-up gulches. It is a well-known and long-ago determined fact that forest destruction diminishes rainfall, and eventually banishes it altogether. Hence the anxiety on the part of all governments to save the native timber intact, knowing that

in its preservation and reproduction is the life's blood of the country itself. Our Western territories have a large portion of their area now mapped as irreclaimable desert wastes, that can never be made productive except by the slow and expensive process of artificial irrigation. It is fair to presume that these empires of desolation, showing, as they do, alluvial soil, have been denuded of their vegetation and timber by the natural or supernatural incendiary. If lightning has been the criminal of course there is no remedy; but if the aborigines have been the culprits, I can only observe that they are no worse than their civilized successors. Standing on the summit of a peak, 13,500 feet above the sea, my view was obscured by the conflagration of an extensive forest of spruce and pine. A weary prospector in search of gold has turned his solitary animal out to graze, and has built a fire to drive off the autumnal cold. The resinous properties of the timber soon ignite a thousand towering torches, and the wild wind, catching the flame, disperses it over hundreds of square miles of territory. This shameful destruction may go on for months. What will be the result? This rich region will become gradually parched; vegetation will refuse to grow without moisture; brooks and streams will die out for ever; the fish which they contain, and the game which they water will leave for other haunts; important feeders of a great river-system will become extinct, lowering the level, perhaps, of such a river as the Mississippi; and one word will be written across the face of the region—desolation. It is apparent, therefore, that the most vital question in connection with that wonderful domain beyond the Rocky Mountains is the preservation of forests. Upon their inviolability depend the future homes of "the unborn millions yet to be." While it is possible for one ruthless adventurer to build his camp-fire in the wood and leave it to the mercy of the winds, thus laying waste to what would make a respectable county in our commonwealth, the destruction and consequent physical disorders will go on. Appropriate legislation sternly executed is the only remedy; and let us hope that it will find a place on our statute books, and be enforced without fear or favour.

The ascent of Italia Peak was eventful to me as affording the grandest view I had ever seen. I counted from the summit eight distinct mountain ranges, more than 200 peaks, each over 13,000 feet above the level of the sea, and 500 peaks, every one of which was 10,000 feet in height, and the traces of hundreds of streams. Figures like these would have excited my credulity had I not been an actual observer.

In no other mountain range in the world can one see in the limits of one horizon a corrugated land like this. The Himalayas present gigantic mountains rising 28,000 feet above the sea into regions of perpetual ice and snow; the Andes furnish Aconcagua and Sahama, lifting their frosted cones heavenward over 23,000 feet; the Alps have Mounts Blanc and Rosa, each higher than the king peaks of the Rocky Mountains; and Mount Ararat itself stands in the first rank of superior peaks. But from none of these can be seen the stupendous upheavals, the hundreds of miles of terrestrial convulsions, the perfect forest of mountains radiating from that ice-cold summit toward all points of the compass.

We began the ascent at 9 A.M. from the south-east

side of the mountain, having followed an Indian trail from Cement Creek, where we camped that night. We tied our horses at timber line. The line of ascent was over loose rock tumbled down from the side ridge of Italia by the expansion of ice imbedded in the crevasse. For the first few hundred yards the approach, while not steep, was very disagreeable travelling, tearing our boots, rendering creeping a necessity. About 1,000 feet from timber line we reached a jagged edge or divide, which if not as sharp as a knife, was certainly as sharp as upheaved rocks well can be. We carefully climbed up this edge, feeling our way over split rocks, often loosened from the mass, knowing that an incautious step, or the giving away of a single inch of granite, would precipitate us down the ugly declivity 2,000 feet below. While coolness is the only attribute that gives certainty of life in such situations, I doubt if any one has entire peace of mind. Jokes pass freely; there is a grim smile on every face in the party, but I observe that the muscles tauten, the grip is sure, the caution excessive, and anxiety is not a stranger to the facial changes, not even terror itself. Up and down along this divide, for about 800 feet, finding a foothold now below, now above, lowering one's self down narrow chasms in the rock, again hanging by the hands to a strong stratum for a moment's rest, at noon we finally reach a minor summit, 12,200 feet above the sea. But we were not up yet.

Accompanied by Mr. Brodhead, we now began a necessary descent of a rocky gorge piled up with granite blocks. The progress was slow and perplexing, involving a downward descent of 1,000 feet. This accomplished, without adventure, we passed along the divide, and were at the base of the main peak. Here began severe physical climbing. At every ten steps, so steep was the mountain side, so loose the earth, and sharp the fragments of stone, that we were obliged to stop—"blown." The pulmonary exertions at such intervals were violent indeed, causing dizziness, stomach-sickness, rush of blood to the head; and if perchance you are unfortunate enough to cut your boot into the fleshy part of your foot, the ascent is not thereby sweetened. During adventures like these, a piercing wind, borrowing an icy chill from the snow and ice, penetrates to one's inmost. As panting mountaineers struggling in friendly rivalry, I am sure my companion and myself were not in enviable situations during the 2,000 feet that intervened between us and this summit. Climbing up the bald side, making slow progress, we reached the tip-top, 13,400 feet above the sea, at 2 P.M.

Let us now, beginning to northward and following the points of the compass around to eastward, take a view of this magnificent scene. As I scan the horizon, I can see eight ranges. The Elk Head Mountains; the Elk Mountains proper—a range 80 miles long; the Sawatch, or principal range of the Rocky Mountains; the Park range; the Snowy range; the Sangre de Cristo range; the Uncompagre range—a massive agglomeration of unnamed and gigantic peaks, bounding the southern horizon; and the San Juan group—unexplored. In these ranges are the loftiest and grandest mountains of the domain belonging to the United States. I do not think I could have a superior point of observation than Italia itself, an upheaval of eruptive, igneous rocks, lying in loose

stratification, and discoloured by the presence of iron, resembling in their hue the close-grained porphyries of Egypt. At a distance this peak looks like the Italian flag, and is so named because of that fact. On its northern slope columnar granites rise above their surroundings, forming isolated monuments; loose beds of shale extend into the valley, where I detect two small, frozen lakelets. The view, over folds of hills and intervening valleys, extends to northward, embracing Grizzly Peak, 15 miles distant, catching the fading summits of the unknown Elk Head mountain range, 100 miles away. Spruce, fir, and cedar trees, bearing their oceans of foliage in the brisk wind with peculiar rigidity, are in their dark hues relieved by the lighter tints of the quaking asp. Wooded hills, terraces, and moraines, losing their sharp outlines in the dark and fading distance, make up the scene of comparison and contrast, as the moving and silvered nimbus clouds give an artistic completeness to the whole. Turning slowly to eastward, La Plata, Elbert, and Massive Mountains are seen; while beyond there we have glimpses of the famous Park range, itself containing hundreds of lofty mountains. Turning a little more to eastward, and at our feet is the Gunnison Park, and the sources of the Gunnison River—a stream winding in all directions, and fertilizing hundreds of thousands of square miles. In all this quarter of the horizon, the number and variety of colours are amazing. Now some peak is touched with a deep carmine of royal purple, and again we find the blank slate colour marking the mountains which flank the Luke-Creek Pass—the main divide. These mountains, although superb in their structure and altitude, have no name. To southward of eastward are those three gigantic mountains, Harvard, Princeton and Yale, sitting at the edge of South Park, bold, sharp, and defiant like those rock-bound colleges themselves. Our pack-train is slowly winding its way over the summit of a hill in my foreground, bound for Italia Creek; and 50 miles to the south-east of it is the Snowy range—not snowy like Blanc and Chimborazo, but just sugar-coated like the crust of a too tart pie. Sullen clusters of timber, populated by the grizzly bear, and containing untold herds of deer and elk, diversify the view, as I take a glance at the Sangre de Cristo range, all but invisible 100 miles away. This is a sharp and narrow range, almost parallel with the Great Sawatch range. Again I get a distant view of the Gunnison Valley—now a broad, undulating region, that must eventually become a garden spot on this slope. Almost due south is the majestic Uncompagre range—unexplored until last season, but since surveyed by Mr. Wilson; there are, perhaps, a dozen peaks in this range above 14,000 feet in height, forming a magnificent barrier against the southern sky. Uncompagre Mountain, the king-pin of all, rises like a huge dome, covered with ice and snow, but exhibiting dark patches of its granitic formation. *Los Vinos* Indian agency, where the Indians gather to wage war for flour and general supplies, lies in the open beyond the Elk Mountains, while Crested Butte, and Gothic Mountain, and Washington Gulch are all within an area of 50 square miles. Again, in the dim distance is the San Juan range, also being explored by Mr. Wilson. To westward the peaks are too high and too numerous to permit an extended view, the sharp head of Capitol Peak jutting up behind its neighbour

Mount Daly, while Maroon Peak, Pyramid, Teocalli, and Castle Peaks close up the circumference of the horizon. Such in brief is the view of a mountainous region of 60,000 square miles, and the grandest mountain region in the world. Teocalli, named after the sacrificial mound of Mexico, is itself one of the most curious mountains known, seemingly built up in horizontal strata to the apex; every view of it presents the same appearance of artificial work. Passing along one day with the train, I asked one of our sapient packers if he knew why yonder peak was named Teocalli. "Yes," he replied with ambitious haste; "it was named after Mr. Thomas O'Kelly, who is a well-known prospector in the mountains."

You can perhaps imagine from this brief description a scene enlivened by forest fires perpetually burning; herds of deer and elk running in all directions along the glistening streams that shine like fragments of mirrors in the deep valleys, thousands of feet in all directions; the short crack of the rifle whose bullet ends the life of a mauve-coloured buck or doe; and the movements of the topographer and geologist, instrument in hand, marking the structure and conformation of the extended area.

Our ascent of Mount Daly afforded me remarkable scenes for study.

After penetrating the thick and sharp-pointed branches of a pine forest, completely filling up a gorge, we made our way up the hill side of a long moraine, and continued our journey westward. Moraines of a long, tomb-like shape are seen in every direction, and there they stand, mournful sepulchres of a once mighty physical age, when the grinding ice, piled up thousands of feet, carved out the valleys and amphitheatres, and, as huge and many-edged chisels, completed the sculpture of the continent.

The most difficult work of the expedition was in finding appropriate names for mountains, streams, and parks. Heretofore the system of nomenclature has largely followed the tide of politics. When Mr. Colfax was at the zenith of his popularity he was made illustrious to an extent too ludicrous to be believed. Fremont is probably celebrated twenty times; General Grant has more than a dozen geographical monuments. Probably the most astonishing use of proper names is in the case of Mr. Laramie, an enterprising Canadian trader. We have the Laramie range of mountains, a gigantic upheaval; Laramie Plains, Laramie City, Mount Laramie, Fort Laramie, and the Laramie division of the Union Pacific Railroad. This plurality is not always pleasing. Professor Guyot, the venerable and distinguished geographer of Princeton College, is the victim of a small peak in North Carolina, and justly honoured by a noble one in the Rocky Mountains. The former, named without his approbation, he ignores; but the latter Dr. Hayden selected as a deserving tribute to his great attainments. A noble mountain in the Elk range was named after our President, Chief-Justice Daly, in recognition of his eminent services to science, which Fellows of the Society can so readily indorse and applaud. But the lavish distribution of proper names over the face of the country is a vicious principle, inducing confusion, and perplexing the student. Yet it will go on until some patient scholar shall sit down and tabulate a comprehensive system to be adopted by the Government. Whoever shall undertake this task must be a profound philolo-

gist; for there are over 1,000,000 peaks in the Rocky Mountains, and only 40,000 words in the English language.

The survey of the territories as prosecuted by Dr. Hayden exhibits the scientific progress of our time; for the maps made under his direction show finer topographical distinctions than those obtained by the older methods; indeed, none of our States, if we except California, have creditable maps, executed on a plan of unity and precision. Dr. Hayden selects a defined area, and exhausts it in geography, and almost every collateral branch of science; and this is the reason that Geikie, the eminent geologist of the University of Edinburgh, writes, "Your Yellowstone work has roused the greatest interest here; and the way in which you have illustrated it by description, engravings, maps, sections, and photographs, is quite a triumph of scientific exploration, and almost arouses a feeling of envy in the breasts of governmental geologists like myself who either have no such splendid materials to work upon or are in the hands of economical governments who will not allow them to publish fully the results of their labours." There is one hundred and fifty years of labour in the territories for Hayden and the other government expeditions before we shall have a knowledge of what we own; but before that time it is probable that the net-work of railways west of the Mississippi and the growth of the far western political fabric will increase the Union to one hundred States, the new-comers each larger than Massachusetts; and not a few of them will be on those great plateaux flanking the Rocky Mountains.

What is needed to develop to the highest degree, and with the most satisfactory results, this, the fairest region of America is:—Firstly, a gathering of all the Indians within the borders of Indian territory, their consolidation into sympathetic tribes, and the appointment of an army police to maintain order and to assist, when necessary, in executing the laws, and when the moment shall be deemed expedient, to give them a special system of civil jurisprudence, eventually admitting them to the rights of citizenship and state sovereignty within the Union. This would, in a short time, dispose of the vexatious Indian question, large army appropriations, and annual Indian wars. There are 300,000 Indians of all ages and sexes in the United States.

Secondly.—An entirely new and complete system of laws, fundamentally new, and adapted to western life, should be drawn up by a commission authorised by Congress, to consist of three of the purest and ablest public men from each territory. The past should be ignored, and statutes should be framed and adopted of a simple but comprehensive character, that would leave little to be done by a State subsequently admitted to the Union. Wise provisions would be these:—

1. That no man should be eligible to the gubernatorial office who shall not have been for five years preceding his appointment an actual resident of the territory.

2. That each territory shall undertake the systematic exploration and survey of its own domain, under the general direction of a bureau of exploration, especially created at Washington.

3. That the territorial government shall be responsible for the preservation of the public domain.

Thirdly.—Liberal landed inducements to settlers and capitalists.

Fourthly.—Irrigation by the government.

Fifthly.—The encouragement of narrow-gauge railways.

Sixthly.—Stringent laws to punish those who deceive capitalists by spurious enterprises, thus destroying the prospects of the territory.

Seventhly.—A government bureau of mining to secure fair dealing.

Eighthly.—A territorial department to protect the forest from destruction.

And here I would call attention to four important maxims—

1. Beware of rose-coloured pamphlets.
2. Move with deliberation, and never rush with the crowds.
3. Divide all dazzling enterprises by four, and ask yourself if you can afford to lose the quotient.
4. Narrow-gauge railways are the surest forerunners of a healthy civilization.

I visited Utah in October and was received by Gentiles, Brigham Young, and the minor Mormons, with the utmost courtesy.

My general impression is that polygamy is a doomed institution. As long as the Saints could maintain isolation, living a three months' journey from California, and four months from the Missouri River, polygamy could be compelled by the fierce threats of the autocrat from the rostrum of the tabernacle. But when the railroad came, fashion invaded the realm of the Latter-day Saints. The women began to despise their coarse gowns, and peasant lives; and soon Salt Lake City was embellished with fineries scarcely inferior to those sold in New York. Thereafter more than one wife severely taxed the purses of the seers and prophets, who, as a class, are men who love money. Plurality in marriage began to lose its fascinations; a son of Brigham Young rid himself of a duplicate partner, and in domestic matters obeyed the behests of the Christian creed. Household ties loosened; and in the family of the prophet himself bitter dissensions arose as to the distribution of his large wealth. The young girls and men who have grown up since 1850—now unmarried—and of whom there are 30,000, abhor polygamy, and will not embrace it; and the President is powerless to coerce. Their religious belief, constantly riddled by satire and stung by ridicule, is slowly ebbing away. The success of Mormonism was due to heedless persecution, which always gives strength to every imposition; for repressive measures only serve to strengthen the institutions they are designed to destroy. The death of Brigham Young will undoubtedly speed the disintegration of the Mormon legions.

Utah has no territorial or municipal debt. There are 242 miles of railways and 1100 of telegraph. The population is about 150,000. There are about 264,500 acres of land under cultivation. The exports for 1873 amounted in value to \$10,000,000 consisting equally of ore and bullion and agricultural products. Mountains of silver, lead, copper, iron, salt, sulphur, and coal are found here.

On the exploration of this great region of the continent nearly \$20,000,000 have been spent since 1803—enough to have completed the survey of the public domain, if systematic work had been followed.

But as it is, nearly all our information of value has been collected during the past ten years. The Coast Survey alone has spent on the average over \$200,000 annually west of the Mississippi; and, generally speaking, in connection with exploration, over 10,000 men have been employed. Significant facts connected with that extended area should not escape attention. In the first place, two-fifths of the entire area of the United States is so arid that even irrigation cannot redeem it; indeed, west of the Mississippi, one-sixth of the entire territory is alone susceptible to cultivation; and if you ask the reason why, the answer is plain—the great unwatered plains traversed by the Union Pacific Railway are essentially Asiatic, with Asiatic deserts, climate, and ethnological relics. It is Asia on this side of the Pacific; while the eastern half of the Union resembles Europe in configuration, climate, flora and fauna. In Colorado, New Mexico, Arizona, Nevada, Utah, Wyoming, Idaho and Montana, not one-fifteenth of the area can ever be rendered available; and it is doubtful if any of these territories will support more than 300,000 people at a time—from our present knowledge of their resources and agricultural methods; and in the territory of Wyoming not over 5000 square miles of the 100,000 square miles of area can be termed arable land.

My visit to Colorado was the pleasantest period of my life, half of which had been devoted to domestic and foreign travel. I saw nothing but the bloom and beauty of the present, and the golden promises of the future. The terrors described by the early explorers had passed away; the dangerous beasts, untouched, displayed no aggressive ferocity; the early miscreants, who killed and plundered, had died or fallen into honest pursuits; the wild gold fever was subsiding into a regular and organized business; towns and cities were putting on the manner of our social East. The civilising methods, no longer what they were but twenty years ago, were in active operation, defining the abodes of the future millions. Everything and everyone seemed to be settling from a long and wearying fermentation. Caution was replacing recklessness, stability the fragmentary institutions of other days, and in the midst of this region of mountain and valley, this region of the grand and picturesque, this land of prosperity for ages yet to come, I felt that there was but one great work to be accomplished—the admission of Colorado into the Union, and that has been the redeeming act of the 43rd Congress.

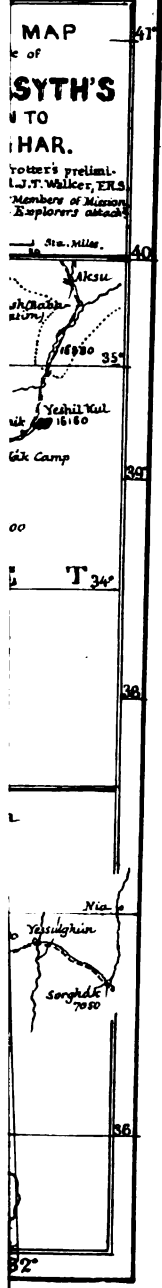
ALVAN S. SOUTHWORTH.

Secretary of the American Geographical Society.

THE NORTH-WEST AFRICAN EXPEDITION.

WHEN Mungo Park visited the kingdoms lying upon the Upper Niger, he found them peopled by a race of highly intelligent men with whom he thought a trade of considerable importance might be done. Since his days other travellers have confirmed his opinion, and it is now a well-known fact that in North-West Central Africa there exists a market for our goods, which once opened, would amply repay any expenses entailed by so doing.

But though the existence of this market will not be denied, it is situated in such a position that commercial intercourse with it has hitherto been of the most



meagre kind. Surrounded as it is on the north by the arid sands of the Sahara, and on the south by the barriers of the Kong Mountains, access to it has been a matter of extreme difficulty.

Caravans start from Tripoli and Morocco, and after a weary journey of many months across the desert, succeed in bringing in a very small quantity of European goods to Timbuctoo, Kano, Sokatoo, and other commercial stations, but with their cost so greatly enhanced, that in spite of the great desire of the inhabitants to possess themselves of European manufactures, only the wealthy few can avail themselves of the opportunity given them of so doing by means of the caravan trade. The freight of goods by camels from Tripoli to Timbuctoo has been estimated by several high authorities as about 40*l.* per ton! At the present day, as was the case in the earliest ages, the camel is the only means of transport, since the Niger is impassable from the sea above Rabba, and a journey across the Kong Mountains is out of the question altogether.

Mr. Donald Mackenzie, an engineer, some years ago turned his attention to this part of Africa, and the result of his investigation has been as follows:—The north-western portion of the Sahara, west of the table-lands of Mourzuk and Asben, consists of a vast depression, many feet below the level of the sea. This huge basin stretches from the fertile regions of Taflet and Twat on the southern slopes of the Atlas to within a few miles of Timbuctoo, and from Truza and Azawad westward to the high lands of Maghter and Aderer near the Atlantic. In shape it is somewhat similar to an irregular parallelogram, and its boundaries are most clearly defined by steep cliffs and high banks, which, as does the whole bed, present indisputable evidence of their having been washed by the sea in comparatively recent times. From the north-west corner of this depression a V-shaped valley runs towards the Atlantic, its mouth being known on our charts as the river Belta, opposite the Canary Isles. Travellers who have crossed tell us that it appears as if the sea had left it but yesterday, and its bed is also, like that of El Juff, considerably below the sea level. Accumulated sands at the entrance, however, have blocked out the ocean, and under the intense heat of a tropical sun even such an inland sea as was El Juff must soon disappear, leaving only the precipitated salt and marine débris to tell of its former existence.

Mr. Mackenzie's scheme is to cut through the sand-bars which obstruct the mouth of the Belta Valley, and let the waters of the Atlantic again flow over this ancient sea bed. By so doing an inland sea would be formed, which would constitute a highway into the very heart of Africa. The enormous mineral and vegetable wealth of Taflet and Twat would be at once placed near at hand. The Asben and Twarick countries would be brought within the reach of civilization, while the kingdoms of Bambara, Songhay, Houssa, &c., with their twenty millions of inhabitants, would be lifted out of their isolation, and goods which now have to pass over 1700 miles of desert, occupying *four months* in transitu, could be placed in the hands of the Arabs in fourteen days from the time they left the manufacturer, and Timbuctoo would be brought within 800 miles of the Atlantic.

In exchange for our goods we should receive coffee, cotton, indigo, rice, india-rubber, copper, &c., which

are abundant, while the fertility of the country is such that almost any tropical product might be grown.

To accomplish this great work a survey is the first thing to be obtained, and the North-west African Expedition will be despatched with that object. Mr. Mackenzie will be accompanied by Mr. J. A. Skertchly, F.R.G.S.; Mr. S. B. J. Skertchly, F.G.S., of H.M. Geological Survey; Mr. A. Fairlie, ex-Engineer to the Emperor of Morocco; Mr. Henry F. Brion, and other gentlemen, so that a complete and exhaustive survey of the valley of the Belta and the boundaries of El Juff can be made.

From the researches of Dr. Barth, Caillie, Panet, Riley, and other travellers, a relief model of the district has been prepared by Mr. Henry F. Brion, by which it can be at once seen that El Juff is a natural depression, into which the Atlantic waters would at once flow if the sand-bars at the mouth of the Belta were cut through. This model may be inspected and every information obtained at the offices of Mr. W. Archer, Norgrove Buildings, Clark's Place, Bishopsgate, E.C. Eminent engineers who have been consulted on the subject are unanimously of opinion that no serious difficulty lies in the way of the success of the project; while the trade which would at once be developed would very speedily recoup the promoters for their original outlay, and if the arid desolate waste of El Juff, within whose bosom not a living thing exists, can be converted into an inland sea, Northern Africa will be at once laid open for the advancement of Christianity and commerce.

The expedition is entirely supported by voluntary contributions, and hopes to start during the present month. On their return, should their report prove favourable, the engineering operations will be commenced and the idea carried out.

J. A. SKERTCHLY.

MAP OF SIR DOUGLAS FORSYTH'S MISSION TO KASHGHAR.

WE are indebted to the kindness of Colonel J. T. Walker, R.E., F.R.S., the Superintendent of the Trigonometrical Survey of India, for an early proof of Captain Trotter's preliminary map illustrating Sir Douglas Forsyth's Mission to Kashghar.

The results achieved by the members of this mission are of the highest geographical interest, and we therefore place this map at the earliest possible opportunity in the hands of our readers. A more perfect map, embodying the whole of our knowledge of that portion of Central Asia, we propose to publish in one of the next numbers of our magazine. The positions of all places visited by the mission depends upon Captain Trotter's astronomically fixed position of Kashghar (Yangi-shahr), viz., latitude $39^{\circ} 24' 26''$ N., longitude $76^{\circ} 6' 47''$ E., from Greenwich. The routes followed by the European members of the mission are indicated by continuous red lines, those of native assistants by dotted lines. Amongst these latter that of a Pundit down the Abi-Panjah to the frontier of Darwaz, is the most important. Another native explorer carried a traverse survey from Tashkurgan to Yarkand, and a third, Krishna, proceeded to Khotan during Captain Trotter's absence in Wakhan, and penetrated as far as the Sorghák gold fields. Then, returning to Kiria, he struck southwards along the road to Rudok, and reached the village of Noh, which is about 20 miles to the north of Rudok. Here he was stopped by the Chinese officials, but eventually he was permitted to go direct to Leh by the Pangong Lake.

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Reviews.

SIR RODERICK MURCHISON.*

THERE have been very few men, in our time, whose life embraced so wide and varied a sphere of usefulness as that of Sir Roderick Murchison. Not only was he himself a prominent labourer in the field of geographical research, but his influential encouragement and guidance was a most important aid to many other workers in various branches of science and literature. He thus had the rare good fortune of continuing his career of usefulness long after his own time for work in the field was past. For him there was no retirement, no cessation of valuable labour, and although he lived to a good old age, his loss was as much, or perhaps even more felt, than if he had been cut off in the prime of life.

Sir Roderick was justly anxious that, in the record of his life, his own labours in the field, his career as a geologist, should form the most prominent feature. It is this career—the distinguished position he won for himself by his indefatigable industry, combined with talent of a high order, as one of the leaders and founders of the science of geology—which will secure for him a permanent place in history. He, therefore, did well in selecting a geologist as his biographer, and Mr. Geikie has performed his difficult task with much judgment and literary skill. By including a sketch of the more salient features in the rise and growth of the geology of the older formations in Britain, and notices of contemporary workers in the same branch of science, he has brought out, with more distinctness, what Murchison's own labours were, and what he actually achieved.

Roderick Impey Murchison was born at Farradale, in Ross-shire, on the 19th of February 1792; the son of Dr. Kenneth Murchison, a surgeon in the East India Company's service, who, on his retirement, bought the estate of Farradale in 1786, and settled down as a Highland laird. His mother was a daughter of Mackenzie of Fairburn, and the first fruits of her marriage received the name of Roderick from his maternal grandfather Roderick Mackenzie, an old laird who lived for more than ninety years. The second name was after Sir Elijah Impey, the Chief Justice of Bengal and an intimate friend of Dr. Murchison. Losing his father when only four years of age, he left Scotland and never resided in that part of the island afterwards, so that he was entirely free from any Scotch accent. His mother was married a second time, to Colonel Macgregor Murray, and in 1799 young Roderick was sent to the grammar school at Durham, where he remained for the six following years. In 1805 he went to the military college at Great Marlow.

He was induced to enter the army by his maternal uncle, General Mackenzie of Fairburn, and, at the age of fifteen, he was gazetted to the 36th regiment. In August 1808 he was present at the battles of

Vimiero and Rorica, of which he gives a detailed account in letters to General Mackenzie. Murchison also served with Sir John Moore in his famous retreat to Coruña, a hard and severe experience for so young a soldier; but we miss, in the narrative of Mr. Geikie, several of the stories which Sir Roderick was wont to tell of his old campaigning days. He afterwards served in Sicily as aide-de-camp to his uncle General Mackenzie.

The turning point in Murchison's life was undoubtedly his marriage with an accomplished and highly educated lady, who gradually turned his mind to higher things than fox hunting and shooting, and continued, during the busiest period of his working life, to be a sympathetic companion and fellow labourer. On the 29th of August 1815, he was married to Charlotte, daughter of General Hugonin of Nursted House in Hampshire, and, retiring from the army in the same year, he for some time devoted himself to a life of fox hunting, first in Durham and afterwards at Melton, varied by short visits to the continent. It was while staying at Rokeby, with his old friend Mr. Morrill, that he finally resolved to abandon the aimless and useless life he was leading. He met Sir Humphrey Davy at Rokeby, and experienced much gratification from his lively illustrations of great physical truths. Sir Humphrey encouraged him to study chemistry by attending lectures, and as his wife strongly backed up this advice, he sold his hunters and, after a short residence at Nursted with General Hugonin, he came to London and changed his whole mode of life.

In 1825 Roderick Murchison commenced his new career. "Henceforth," says Mr. Geikie, "he was to have an occupation even more absorbing than any which had yet held him in thrall, and into this new employment he was to carry all the energy which had hitherto marked his doings in other pursuits. From that time forward it was to be his good fortune to have one engrossing occupation, which, while furnishing abundant exercise and amusement, before long enabled him to make his name a kind of household word among geologists in every part of the world."

Murchison's active field work as a geologist may be said to extend over the following quarter of a century; and the story of it is admirably told by Mr. Geikie. After a dozen years of close study and untiring labour in the field, his great work, "The Silurian System," was published in 1838. "It forms one of the landmarks in the history of geology. It gave for the first time a detailed view of the succession of the geological formations of more ancient date than the Old Red Sandstone," and thus opened up a whole series of new chapters in this marvellous history of life which geology unfolds. Dr. Whewell spoke of it "as an admirable example of the sober and useful splendour which may grace a geological monograph." Murchison's term "Silurian" was henceforth adopted and applied to the rocks where similar groups of fossils occur in all parts of the world. This was the great work of his life; and then followed his researches in North Devon, and his more famous campaign in the Ural Mountains, which won for him so many distinctions from the Emperor of Russia.

But it is to his career as a geographer that the readers of this magazine will naturally turn their attention, in reflecting on the great services of their

* *Life of Sir Roderick I. Murchison, Bart., K.C.B., F.R.S., based on his journals and letters; by Archibald Geikie, LL.D., F.R.S.* 2 vols. Illustrated with portraits and woodcuts. (Murray, 1875).

long tried and well loved President. On the study of geography Sir Roderick brought to bear the knowledge he had acquired as a geologist, as well as a great store of information collected during a long course of reading, and for forty years of his life the wider and more popular science was only second in his regard to his earlier friend—geology. Mr. Geikie has not altogether neglected the geographical portion of Sir Roderick Murchison's biography, yet, although we fully recognise the greater importance of our old President's work as a geologist, we cannot help feeling that the geographical side of his life-story needed fuller and more adequate treatment than it has received. In the few remarks with which we propose to conclude this notice we shall refer to facts which have been but slightly alluded to, or altogether passed over by Mr. Geikie.

Sir Roderick Murchison joined the Raleigh Travellers' Club in 1828, being proposed by Sir John Franklin, and seconded by Major Keppel. The club had been formed in the previous year with the object of bringing together travellers in all parts of the world. In 1830 there was a memorable meeting of five members of this club, in one of the rooms at the Admiralty, at which it was resolved to establish the Geographical Society. Those five members were Sir John Barrow, Sir John Hobhouse (afterwards Lord Broughton), Robert Brown (the Prince of botanists), Roderick Murchison, and Bartle Frere, uncle of the late President of the Society. Sir Roderick always laid special stress upon the fact that he was one of the five originators of the Geographical Society, and he caused a memorandum on the subject, in his own handwriting, to be bound up in the Raleigh Club's earliest book. His subsequent aim was to induce all the members of the Raleigh Club to join the Society; and from the first constitution of the Geographical Society in 1830 to the day of his death, a period of over forty years, Sir Roderick devoted himself to the advancement of its interests. In 1844 he was elected President for the first time; in 1852 he was re-elected; and, again, in 1857, 1858, 1859, and 1861. From 1863 until 1871 he was elected, year after year, and the unanimous feeling of the Fellows, whose numbers constantly increased under his auspices, was that his services were indispensable to the Society's well being. In 1854 the Raleigh Club was dissolved, and was succeeded by the Geographical Club, the members of which were all to be Fellows of the Society; and Sir Roderick continued to be President of the Geographical Club from 1854 until the day of his death. In these capacities he took every opportunity of encouraging young travellers, of fostering geographical enterprise, and of giving a warm and hearty welcome to all who returned from any expedition which had for its object the advancement of geographical science. The President of the Geographical Society thus had many opportunities, which he never neglected, of performing kind and gracious acts, and he thus won the warm and affectionate regard of all who had the advantage of his acquaintance, and of hundreds who never saw him, but who derived advantage and encouragement from his generous notices of their labours.

As a geologist, Sir Roderick early saw the importance of comparative geography, by which the changes in the physical aspects of the earth's surface, within the historical period, can be traced. Hence, he warmly

supported the formation of a society for the translating and editing of early voyages and travels. When the Hakluyt Society was formed, in 1847, he was elected its first President, and he continued to fill the presidential chair of that Society until the day of his death, constantly attending its meetings, and taking an active part in the selection of the volumes, and in the choice of editors. The literary work thus accomplished has been of the very highest value to geographical students, and it is strange that Mr. Geikie should have made no allusion whatever to Sir Roderick's labours during twenty-five years, as President of the Hakluyt Society.

The last work of the untiring President of the Royal Geographical Society was connected with the purchase of a freehold house, and the establishment of the institution, which he had loved and served so well, in a home of its own. But he was struck down with his last illness before the move from Whitehall Place to Savile Row was completed. His warm interest in the welfare of the Society, however, still continued; and in one of his very last drives he was taken to the house in Savile Row, and all the doors were thrown open at his request, in order that he might look through into the new map-room from where he sat in his carriage. Sir Roderick Murchison died on the 22nd of October 1871; and he was followed to the grave by the new President of the Geographical Society, Sir Henry Rawlinson, by Admiral Collinson, and by the Secretaries Mr. Clements Markham, Mr. Major, and Mr. Bates. Geographers will most cordially concur in the closing words of Sir Roderick Murchison's biographer:—

“Many a humble fellow worker in science did he encourage and materially assist. When he had given the right hand of fellowship to a man he stuck to him. The devotion indeed with which he espoused the cause of a friend had something altogether chivalrous about it. Let us carry with us through the rest of life the lessons which the dominant features of his character and work may teach: his persevering industry, his readiness to be helpful, his loyalty to friends, and above all his life-long and entire devotion to the advancement of knowledge. It will be many a day before another man arises to fill among us the honourable and useful place from which we shall long miss the presence of Roderick Impey Murchison.”

THE SAILOR'S POCKET BOOK; a Collection of Practical Rules, Notes, and Tables for the use of the Royal Navy, the Mercantile Marine, and Yacht Squadron; by *Commander F. G. D. Bedford, R. N.* (H. M. S. 'Agincourt.') Second Edition revised and enlarged. (J. Griffin & Co., Portsea. 1875.)

WE reviewed the first edition of this valuable and excellently arranged little work when it was first published (See p. 28 of our April number, 1874); and we now gladly welcome the appearance of a second and enlarged edition. Its publication is a proof that both the navy and the merchant service largely share the view we then expressed, as to the great usefulness of Captain Bedford's *Sailor's Pocket Book*. The second edition has been ably revised and passed through the press by Staff-Commander Hull of the Hydrographic Office, while some additional matter was supplied by Admiral Ryder, especially with regard to saving life from shipwreck

WANDERINGS IN THE INTERIOR OF NEW GUINEA. By *Captain J. A. Lawson*. 8vo. pp. 389. Map. London (Chapman and Hall).

CAPTAIN LAWSON has written a very amusing book of travels in New Guinea. He describes circumstantially a journey inland, from a village near Torres Strait to within 30 miles of the north coast of the island, claims to have discovered several active volcanoes, and to have ascended, in the space of nine hours, a mountain rising to the astounding altitude of 32,783 feet, to a height of 25,314 feet. He encountered, in the course of his wanderings, herds of hump-backed cattle and black oxen resembling the American bison, troops of monkeys, deer in large numbers, and tigers, rivalling in size those of Bengal. None of these animals have been met with hitherto in New Guinea by other travellers, who were content with tree-kangaroos and wild pigs, neither of which Captain Lawson has been fortunate enough to observe there. We understand that the author has brought back to England several trophies of the chase, and we much trust he will be persuaded to exhibit them and read a paper at an early meeting of the Royal Geographical Society.

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QUER DURCH AFRIKA: REISE VOM MITTELMEER NACH DEM TSCHADSEE UND ZUM GOLF VON GUINEA. Von *Gerhard Rohlfs*. 2 vols. 8vo., pp. 668. Maps. Leipzig, 1874-5. London (Trübner & Co.).

THE substance of these two volumes has already appeared in the Supplementary Parts, No. 25 and 34, of Petermann's *Mittheilungen*, but Dr. Rohlfs has partly recast his narrative, so as to render it more readable, and he has added an account of his journey from Tripolis to Rhadames and thence, by a route not previously described, to Fezzan. The meteorological tables have been omitted, but a list of the plants collected, as well as of those incidentally referred to in the work, both the scientific and native names being given in every instance, has been added. The maps accompanying the work are excellent, and contrast favourably with those too frequently accompanying English works of travel.

We need hardly remind our readers that the journey here described is one of the most remarkable ever performed by a European, and was rewarded by the Royal Geographical Society by the award of their Patron's Medal, and as events in Central Africa do not travel with the rapidity they do in Europe, Dr. Rohlfs's narrative, though published five years after his return to Europe, will be read with undiminished interest.

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HUMBOLDT'S NATUR-UND REISEBILDER: Pictures of Nature and Travel from Alexander von Humboldt's personal narrative of travel and aspects of nature, with a commentary, scientific glossary, and biographical notice of the Author. By *C. A. Buchheim*, *Phil.D.* 8vo, pp. 352. London (Trübner & Co.).

PROFESSORS of German have hitherto almost exclusively availed themselves of works of fiction or of history for the purpose of teaching their more advanced pupils. Dr. Buchheim has struck out a new path, and inasmuch as he makes Alexander von Humboldt, the greatest German traveller, his vehicle of instruction, he is deserving the thanks of all those interested in the popularisation of geographical tastes. Dr. Buchheim has selected twenty-seven chapters from the *Travels into the Equinoctial Regions of the New Continent*, and three of the essays from that fascinating work, *Aspects of Nature*. The notes appended to these selections are, as a rule, judicious and to the point, and

the *Life of Humboldt*, prefixed to the volume, will be perused with interest even by those who have read more comprehensive works on that subject.

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DIE SCHWEDISCHEN EXPEDITIONEN ZU ERFORSCHUNG DES HOHEN NORDENS, 1870 UND 1872-3. Von *Dr. Oswald Heer*. 8vo., pp. 48. Zürich, 1874. London (Trübner & Co.).

DR. HEER, the author of the magnificent *Flora fossilis Arctica* and of numerous essays and papers bearing upon the same subjects, discusses in the pamphlet before us the results of the Swedish expeditions under Professor Nordenskjöld with reference to his favourite study.

The fossils discovered in the cretaceous and miocene formations of Noursouk Peninsula in Greenland afford convincing evidence of the secular changes of temperature which have gone on there. The fossil plants discovered in the lower chalk point to a hot and moist climate. At that time there existed luxuriant forests of conifers, amongst which five species of *Sequoia* were the most remarkable, and the Sago tree, at present confined to the southern tropical regions, abounded, as did also gigantic ferns. In the upper chalk sixty-two species of fossil plants were discovered, of which only five had likewise been found in the lower chalk. The *Salisburya primordialis* (Ginko), now confined to Japan and China, is the most remarkable amongst the conifers, but fully one half of the plants are foliferous. The ferruginous clay and sandstone overlying the chalk, and recognized as members of the lower miocene yielded 133 species, of which about fifty have been discovered in the same formation in Europe. They point to a climate similar to that existing in Upper Italy at the present time.

The discoveries made in Spitzbergen, which will be discussed fully in the *Transactions* of the Swedish Academy, likewise prove that a secular change in the temperature of the Arctic Regions has taken place.

We quite agree with Dr. Heer's concluding remark, that researches, such as those carried on by the members of the Swedish Expedition, are more valuable from a scientific point of view than the discovery of new Arctic countries, and regret on this account that no competent geologist will be attached to our Arctic Expedition.

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STATISTISCHE SKIZZE DER OESTERREICHISCH-UNGARISCHEN MONARCHIE, 1847. Von *H. F. Brachelli*. 5th edition. 8vo., pp. 54. Leipzig, 1875. London (Trübner & Co.).

THE numerical statements in our Handbooks of Geography and Statistics are subject to more frequent alterations than the accounts of the physical geography of the different countries, or of the customs and manners of their inhabitants. The publisher of Stein and Wappaeus' voluminous "Handbuch" is therefore deserving the thanks of the numerous possessors of that excellent geographical work by publishing periodically, in the shape of supplements, statistical sketches of the principal states. One of these is now before us. It refers to the Austro-Hungarian Monarchy, and supplies us with the most recent statistics of population, agriculture, industry, commerce, and education, and an account of the constitution and government of that twin-state.

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EGYPTIAN SEPULCHRES AND SYRIAN SHRINES, INCLUDING A VISIT TO PALMYRA. By *E. A. Beaufort* (Viscountess Strangford). London (Macmillan & Co.), 1874.

In this little volume Lady Strangford presents her readers with an interesting description of the scenes

through which she and her sister journeyed some seventeen years ago in their tour through Egypt, Asia Minor, Palestine, and Greece. In the case of some countries *impressions de voyage* of not very recent date might lack freshness, but the authoress remarks with truth that Eastern life appears never to change its distinctive character, and that in Palestine especially, eighteen centuries have in no way altered the type of scenes and customs which are still mirrored in every page of the Bible. The authoress has a keen and appreciative eye for artistic and scenic beauty, and her activity as well as her graphic powers of description have together enabled her to convey to the mass of English readers who cannot visit them, a varied and yet vivid notion of these Eastern countries.

Cartography.

W. and A. K. Johnston's Bible Atlas.*

THE *Bible Atlas* prepared at Messrs. A. K. Johnston's geographical establishment, and published by that firm, is a marvel of cheapness, and cheapness, in this instance at all events, is not associated with inferior workmanship, for the maps are neatly engraved, they are elaborately coloured, and printed on good stout paper. Unfortunately this beauty is hardly more than skin-deep, for if we estimate these maps, at their true value, we reluctantly arrive at the conclusion that their intrinsic merit by no means corresponds to their fair outside.

We may at once state that the topographical substratum of the sixteen maps composing this Atlas leaves little to be desired. Our objections are directed solely against the historical and physico-geographical information which it is sought to convey by means of them. One of the principal points to which the compiler of a Biblical Atlas may be expected to direct his attention is the identification of the sites of ancient towns. Yet, no notice has been taken of M. Clermont Ganneau's identification of the Royal city of Gezer; there figures an Ashtaroth and an Ashteroth karnaim, although no doubt exists respecting the identity of these two places; Kadesh is placed in the Arabah, contrary to the testimony of Rowland and Professor Palmer, and Tarichaea remains at the southern extremity of the sea of Galilee, in spite of the convincing evidence to the contrary simultaneously brought forward by De Bruyn and Quandt.

When we turn to the map illustrating the journeyings of the Israelites from Egypt to Canaan, we miss any indication of their attempted invasion of the promised land from the south, which led to their being pursued "even unto Hormah," nor of their having penetrated to Edrei, where Moses defeated king Og of Bashan.

Map V. professes to show the Holy Land as allotted by Joshua to the twelve tribes, and on that point, we should have thought, Joshua himself would have proved the best if not the only authority. We are by no means adverse to independent criticism, if exercised in a good

* The *Bible Atlas* to illustrate the Old and New Testament, 16 maps. Edinburgh and London (W. and A. K. Johnston, Geographers: Engravers and Printers to the Queen), 1875. Price 1s.

The *Scripture Atlas*, price 5s. 6d., simultaneously published by the same firm, may be described as an *édition de luxe* of the Bible Atlas, the only essential difference between the two consisting in the addition of an index to the former. The difference in the price, however, is fully justified by the maps of the *Scripture Atlas* being printed on one side of the paper only, and by the binding.

cause, and we freely admit that the Biblical narrative is fairly open, in this respect, to a variety of interpretations. Yet there can be no doubt that Gezer was assigned to Ephraim, that Bethlehem was in the territory of Judah, and that Beth Hoghly, Beeroth, and Ophni lay within the "coasts" of Benjamin. This map, likewise, attempts to distinguish between cities of Refuge, Priests' cities, and Levitical cities. The symbols employed have not been chosen judiciously, but allowing the draughtsman the benefit of every doubt, there remains the fact that Hebron is not indicated as a city of refuge, that Libnath and Anathot, though named on the map, are neither shown as Priest's cities nor as ordinary Levitical cities; that Ain, and Alemeth, though identified, are not indicated at all, and that Rimmon in Judah, is shown as a Priest's city, although that character is bestowed upon it in no portion of the Bible. Amongst ordinary Levitical cities one (Ashtaroth or Beeshterah) is shown on the map, but not as such, and four others (Aijalon, Gathrimmon of Dan, Helketh and Mephaath), though satisfactorily identified, are not shown at all.

Plate VII., entitled the "United (*sic*) Kingdoms of Saul, David and Solomon," though merely showing the extent of the dominions of the latter, ought surely to have preceded the map of the "The Kingdoms of Judah and Israel during the monarchy," seeing that the separation into two kingdoms only took place after Solomon's death. Plate VIII. instead of clearly illustrating the captivities has been made the depository of all kinds of information, from the time of Abraham's migration down to the reign of the Romans.

On the map of ancient Jerusalem Mr. Grove's heterodox positions for Zion and the Temple have been accepted without any allusion to that gentleman's name, and we find there an "Asamonoban Palace" in lieu of a Palace of the Asamonæans. Plate X. contains a fancy sketch of Solomon's Temple, which answers to neither of the three temples described in the Bible, and least of all to that of Solomon. On Plate XI. Archelaus is converted into a Tetrach, his true title having been Ethnarch. On the map illustrating St. Paul's journeys the wanderings of that most energetic of the Apostles are indicated very imperfectly. To mention one instance, Miletus, though undoubtedly visited by him on his third journey (Acts, xx. 15), is not touched by any of the routes laid down there.

The two physical maps are equally unsatisfactory. We do not consider that the tints selected—viz., green for cultivable regions, yellow for sand and gravel, brown for sandstone, red for granite, and white (or rather grey) for calcareous regions—are suited to set forth the physical characteristics of the countries delineated. This question, however, we will waive, as being, for the present, of secondary importance. But we cannot help noticing that on the map of Egypt the whole of the sandstone region has been coloured as being "calcareous," and that the existence of other crystalline rocks, in addition to granite, has been ignored with respect to Mount Sinai. The map of Palestine, quite irrespective of the irreconcilable difference existing between the colours indicated in the reference, and those actually employed on the map, is even less satisfactory, and these two maps show very plainly that their anonymous author has either no knowledge of the physical geography and geology of the countries delineated by him, or is utterly incapable of giving expression to his views in a graphical form.

The last map of the Atlas is on a par with most of the others. It curtails, considerably, the territories of the Greek Church and of the Muhammadans, ignores altogether the existence of the Armenian and Abyssinian branches of the Christian church, and peoples Nova Zemlya and Spitzbergen with pagans, &c., thus raising ice-bears to the dignity of human beings.

Taken as a whole, this Atlas contrasts not very favourably with the Bible Atlas published in 1868 by the Society for Promoting Christian knowledge, for although that

work is not free from blemishes, its twelve plates furnish a far more satisfactory and intelligent illustration of Bible history than do the fifteen plates of the Atlas forming the subject of this review.

Petermann's Map of the Argentine Confederation.*

WE cannot help pleading guilty to a slight feeling of envy when we look at some of the maps brought out by J. Perthes's geographical establishment at Gotha.

Dr. Petermann, assisted by a staff of efficient draughtsmen and engravers, backed up by the liberality of his employer, and supported by an appreciative public in all parts of the world, occupies a most enviable position. He is enabled to bring out maps in numbers and of a quality which render competition on the part of others, less favourably circumstanced, almost hopeless. The map before us, compiled, under Dr. Petermann's supervision, by Mr. H. Habenicht, is a favourable specimen of that kind of work turned out in Germany. It embodies a vast mass of material, the very existence of which had hitherto hardly been suspected in Europe, presents us, for the first time, with an approximately correct delineation of a large portion of South America, and renders obsolete all other maps of these countries published hitherto. It need hardly be said that all published maps, including the Admiralty surveys, Pissis's map of Chili, M. de Moussy's Argentine Atlas, and many others, have been duly consulted; but in addition to these Dr. Petermann was able to avail himself of a valuable collection of manuscript maps forwarded to him by Major Rickard. The accompanying letter-press not only supplies us with information respecting the authorities consulted in the compilation of the map, but presents us likewise with a most valuable essay by Professor H. Burmeister, Director of the Museum of Buenos Ayres, on the physical geography and geology of the country delineated.

Gonzalez's Map of Entre Rios.†

THIS is a very detailed map of the Argentine province of Entre Rios, which differs from Petermann's map as regards some of the telegraph lines and topographical features, especially in the northern part of the province. It shows the position of all the private estates, and by a decree of the 15th September 1873, has been declared the official map of the province, which in 1870 had a town population of 53,547, and a country population of 78,891 souls, who owned 1,908,979 heads of cattle, 380,837 horses, and 3,606,788 sheep.

Waltenberger's Hypsometrical Map of a Portion of the Alps.‡

MR. A. WALTENBERGER, a Bavarian surveyor, has devoted his spare time to an exploration of those portions of the Alps which lie nearest to his place of residence, and by combining these with existing surveys he has been able to produce a hypsometrical map of the Alps,

* Mapa original de la Republica Argentina, y Estados adyacentes comprendiendo las Republicas Chile, Paraguay y Uruguay, por el Doctor Don A. Petermann. Scale, 1,400,000. (Mittheilungen, Ergaenzungsheft, No. 30.) Gotha, 1875.

† Carta topografica de la Provincia de Entre Rios, con la demarcacion de Terrenos de Particulares, compilada y construida por Meliton Gonzalez. 1:1,000,000. Buenos Ayres, 1873.

‡ Die Rhaetikon Kette, Lechthaler und Vorarlberger Alpen von A. Waltenberger. (Petermann's Mittheilungen, Ergaenzungsheft, 40.) Gotha, 1875.

of the valley of the Upper Lech, the Rhaetikon chain and the Silvretta group, lying between the Rhine and the Inn. The map is tinted according to height, abounds in detail, and considerably adds to our knowledge of that portion of the Alps. Smaller maps, one showing mountain crests and valleys, the other illustrating the geology, are added, and the whole is accompanied by an instructive memoir on the orography and hydrography of the country delineated. We learn from this memoir that the mean height of the 1100 square miles shown on the map amounts to 5010 feet.

Delesse's Hydrographical Map of Seine and Marne.*

THIS map cannot fail to prove highly instructive to all those civil engineers who are interested in the drainage of land or the supply of water. It shows in an exceedingly perspicuous manner the distribution of surface and internal reservoirs of water, distinguishing those formed on various descriptions of impermeable clays, and those due to infiltration through permeable strata. It likewise shows all wells throughout the department, classifying them according to whether they are of the ordinary description, or obtained by borings or sinking, and giving, in every instance, the depth of the well, the supply of water furnished by it, and other valuable information. Lands artificially drained are likewise shown. On a marginal map we are presented with a general view of internal drainage, and on another shows the hypsometrical features of the country. A comparison of these two small maps is particularly interesting.

E. G. RAVENSTEIN.

Correspondence.

THE OGHUZ TURKS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

DEAR SIR,—Lepechin and Radloff have thrown a great deal of light on the history of the nomadic Turks, and especially on that of the Kirghiz Kazaks. They have mainly the credit of having discriminated between the Kirghises properly so-called, and the Kirghiz Kazaks who are properly styled Kazaks, and have in consequence disentangled a very crooked web in the ethnography of Asia; but they have not exhausted the subject, and I propose somewhat to extend their conclusions. The history of the Kazaks since the supremacy of Jingsis Khan is now tolerably well made out, and I hope to treat it in some detail in a work I am engaged upon.

On the division of the empire of Jingsis, the western portion of his conquests was apportioned to his eldest son, Juji. The clans over which he ruled were collectively known as the Golden Horde. The Golden Horde was itself divided into two sections, the Ak Orda, or White Horde, with its capital at Signak, governed by Orda, the eldest son of Juji and his descendants, while the Kokorda, or Blue Horde, ruled by Batu Khan and his descendants, had its capital at Serai. The Kazaks formed a part of the Ak Ordi, or White Horde, and their chiefs are descended from Borak Khan, a distinguished ruler of that horde in the 14th century.

* Carte hydrologique du Département de Seine-et-Marne, exécutée par M. Delesse, conformément aux délibérations du Conseil-Général, 1864-73. Paris, 1874.

The history of the Kazaks *before the days of Jingis* is singularly obscure, indeed, if we are to follow the standard authorities, it is absolutely unknown. Nor shall we make much way in tracing it unless we find out the name under which the Kazaks were then known, for it seems clear that the name Kazak is as ambiguous as it is probably modern. I do not see my way to this goal by following the notices contained in western histories, and look rather to the Chinese accounts to throw some light on the matter. Now the name by which the Kazaks are known to the Chinese is Hakas. This may be amply verified in the Chinese accounts of the Emperor Kienlung's campaign in Sungaria, and in the account of the return of the Torguts to the country of Ili in the beginning of the last century, in both of which the Kazaks appear very prominently, and in both of which the name of Hakas connotes exactly the same thing as the Western name Kazak, for we have detailed Western accounts of these events as well as Chinese. Now it is an important fact that while Kazak is such a comparatively modern name, Hakas is a very old name, one that occurs in Chinese history long before the time of Jingis Khan. The Chinese accounts wherever I have been able to test them are singularly reliable, and the Chinese names of tribes are generally the indigenous names altered to meet the peculiar sounds of the Chinese language, but altered in a very definite way. Now, on examining the name Hakas from this point of view, and trying to find a Western equivalent for it, we are immediately struck by its resemblance to the name Oghuz. The two names are so alike that it is very surprising to me that it has never been before suggested that they are identical, and not only the names, but also the people. The Hakas are Turks so were the Oghuz; the Hakas are pre-eminently the Turks of Turkestan, of the Altai, and the steppes west of Lake Balkash. It was from here the Oghuz Turks came. The Hakas, or Kazaks, are divided into three hordes—the Great, Middle, and Little Horde. Maçudi tells us that Oghuz Turks were also divided into three sections—an upper, middle, and lower (*D'Ohsson's les Peuples du Caucase*, 146). Thus everything combines to make the identification complete. Nor do I know of a single argument against it. Now, this is a very important point gained in tracing out the history of the Turks, for it enables us to say that the Oghuzes of the Arab writers, who desolated Persia so terribly before the days of Jingis Khan were the direct ancestors of the modern Kirghiz Kazaks, a perfect continuity existing in their histories. This, again, enables us to throw light on another point of Turkish history, which in its turn confirms very singularly the conclusion we have just arrived at.

Among the tribes against which Jingis Khan fought in his early days, one of the most powerful was that of the Naimans, which occupied the northern part of Sungaria, from the little Altai to Karakorum. Erdmann, D'Ohsson, and others, have argued that they were Turks, and in a paper upon them, which I wrote in the *Phoenix* some time ago, I collected the evidence which makes it almost certain that they could have been nothing else than Turks. Not only were they Turks, but, as I believe, they were identical with the Naimans who still form such an important section of the Middle Horde of the Kirghiz Kazaks. That they, in fact, were then the predominant tribe of the Kazak confederacy, and gave it its name. Now at the accession of Jingis, Karakorum, the celebrated capital of the Mongols, was within the territory of the Naimans. Thus, Abulghazi says, speaking of the Naimans—"They had their camp in the place called Karakorum in Mongolia" (*Abulghazi, ed Desmairons*, ii. 47). The name Naiman, which simply means eight, does not occur, so far as I know, as a tribal name in history before the days of Jingis, but Karakorum does. When Ogotai Khan began to build his capital at Karakorum we are told that it was among the ruins of an old city. Among them a pillar was

found with an inscription upon it declaring that on that site Buku Khan, the chief of the Uighurs, had, in the 8th century, built his palace, and that it had been the residence of his successors. Karakorum was, in fact, the capital of the old Uighur Empire. This empire was overturned in the 9th century by an invasion of the Hakas, who had lately become very powerful. The account may be read in detail in the annals of the Thang dynasty, published among the Jesuits' Memoirs on China. The Uighurs were driven away, and migrated to the south-west, to the country of Bishbalig, while the invaders took possession of their land. At this time the Chinese accounts cease for a while to give us any light on their northern neighbours. When the curtain rises again in the days of Jingis, we find Karakorum the old Uighur capital in the occupancy of the Naimans whom we have just shown to be Kazaks or Hakas, that is in the possession of the descendants of the very folk who had wrested it from the Uighurs. This fact rounds our story off remarkably, and makes our conclusion almost certain. I have more to say, but shall postpone it for another letter.—Yours, &c.,

HENRY H. HOWORTH.

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THE ETYMOLOGY OF "TURKMAN."

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Your correspondent (see April number, p. 118) is quite right in not agreeing with the Persian or Oriental etymology of the word Turkman. *Manend* or *menend* (meaning like) can with difficulty, if ever, be contracted into *men*, coming, as it does, from *mänden* (to remain, to resemble), and not from *menden*. "Resembling Turks" is, too, a most awkward and unsuitable denomination for a people which is distinguished by comparatively pure Turkish ethnographical features.

But if Mr. Howorth rejects the etymology of Rushidin and Mirkhond, he does not do well to accept the pious Muhammadan etymology of Neshri, who, in spite of being one of the earliest Ottoman writers, has but very little notion of the true spirit of the Turkish language. For, even in his day, the word *Türk* was analogous to *raw, uncultivated*, just as the word *Oguz*, from which came the word *oguzane* (*boorish, thick-headed*), and *oguzluk* (*coarseness*). Neshri's etymology is entirely based upon Muhammadan devotional feeling, and is quite a linguistic impossibility. *Türk iman* are two separate nouns, which cannot be composed by an *ezafet*. We can say, for example, *din-i-ingiliz* or *iman-i-türk* (the faith of the English, or the faith of the Turks), but not *ingiliz-i-din* or *türk-i-iman*. Finally, it must not be forgotten that the name the Nomads themselves adopt is *Türkmen*, and Turkman is applied to them only by the Persians.

My own opinion of the origin of this word has been expressed in my *Travels in Central Asia*, p. 301, and I still adhere to it. *Men*, a generalising suffix, corresponds with the English terminations *dom, ship*, and may be found in many other words, such as *kölemen* (slaveship), (the Turkish name for Mameluks, *memluk* means in Arabic a slave), *alakman* (a company of robbers or riders), *alak* (robber), &c. Turkmen signifies therefore a congregation of Turks, viz., the Turks, *par excellence*, in opposition to the generic and more recently adopted names of Ozbeg, Kazak, Kirghiz, &c.

Yours, &c.,

A. VÁMBÉRY.

THE UNIVERSITY, BUDAPEST,
15th April, 1875.

Log Book.

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Arctic Appointments.—The advantages of a Government over a private Arctic Expedition certainly outweigh the drawbacks, and this was clearly perceived by the Geographical Society in advocating, and at length securing, the despatch of the Expedition. One of the most serious drawbacks is the danger of jobbing the appointments, and of yielding to the crotchets of irresponsible persons and newspapers. This danger has proved to be more real than was expected, and its most recent phase has appeared in an unforeseen shape.

The Arctic Committee, after much deliberation and thought, recommended the proper staff of officers and men for the Arctic Expedition. But the complement, thus wisely and carefully laid down, has been altered by the addition of "Idler" after "Idler" by the Admiralty, to the exclusion of valuable executive officers whose loss will seriously impair the efficiency of the enterprise. The last alteration has been the appointment of two chaplains to the exclusion of two assistant paymasters, whose duties are most important. This has been done in defiance of the opinions of the Arctic Committee and of every experienced Arctic officer, and without considering the wishes of the officers and men in the expedition. There are other special reasons against these appointments. No ship in the service with less than 170 men has a chaplain, while the Arctic ships will be absent for a shorter time than the usual commission of three years. Moreover, the crews of the Arctic ships consist of Roman Catholics, Wesleyans, and Presbyterians, besides Church of England men, and the introduction of an element of discord is much to be deplored. These additional "Idlers" will consume provisions, entail a useless expenditure of several thousands, take the places of men who can ill be spared, and will come between the captain and his men in the performance of one of his most important functions. The latter evil is a most serious one. The commander of an Arctic Expedition reads daily prayers, performs divine service on Sundays, attends, with his officers, to all the needs of his men; and these ministrations have an important influence on the well being of the expedition by uniting all in a common bond of sympathy and fellowship. Men of all denominations cheerfully attend the ministrations of their captain—the leader who shares all their toils, and to whom they look to lead them to success and to bring them safely out of danger. Those who have served in the Arctic Regions know how valuable and important is this religious bond, and how mischievous will be its wilful severance by hampering the expedition with chaplains. The injury thus done to the expedition, apart from that of saddling it with unnecessary idlers who consume provisions and deprive it of the services of valuable officers, is certainly most serious.

Blasting the Ice.—At page 71 of our March number we referred to the valuable aid afforded by blasting with gunpowder, both in forcing a way through the ice, and in cutting out of winter quarters. In former expeditions ordinary black gunpowder was used

in charges of 5 to 10 lbs. in tin canisters with Bickford's fuze. Since then gun-cotton and cotton gunpowder have come into use. Gun-cotton is objectionable owing to danger in stowage, uncertainty in explosion, being liable to misfire, and requiring to be dried before use. But the new cotton gunpowder is free from all these objections, while it is superior to the Government gun-cotton in power and cheapness. The advantages which cotton gunpowder has over ordinary black powder are numerous. It is a much more powerful explosive, its proportionate strength to common powder being as eight to one, and it is perfectly safe. If put into the fire it will burn quietly without any explosion, nor will it explode on concussion. The explosion can only be produced by the use of a special detonation. Yet, in the face of these facts, the Admiralty have refused to allow this admirable auxiliary in ice navigation to be used, and have ordered a supply of Government gun-cotton to be sent out, together with the old-fashioned charges of black gunpowder in bulky canisters.

The Swedish Arctic Expedition.—This expedition will be despatched entirely at the expense of M. Oscar Dickson of Gottenburg, and will be under the command of Professor Nordenskiöld. Two botanists will be attached to it, Dr. F. Kyellmann, who accompanied the Spitzbergen expedition in 1872-3, and Dr. N. Lundström, both gentlemen being graduated professors of the university of Upsala, two zoologists and a dozen Norwegian whaling seamen. It is proposed to start from Tromso in the early part of June on a whaler specially chartered for the expedition, and to make for the south of Novaya Zemlya, whither Samoyedes resort during the summer months. Here some time will be spent in geological, botanical, and ethnological investigations, after which, should the ice prove favourable, they will coast along the west of Novaya Zemlya, double its northernmost point (presumably about the middle or end of August), and push on in an easterly direction to the mouths of the Ob and Yenisei, a region which is known to be rich in mammoth bones, and other prehistoric remains. If navigation should still be possible the vessel will return to Tromso by way of the Matochkin Shar or straits of Kara, and Professor Nordenskiöld will ascend one of the two Siberian rivers mentioned, and return overland. The expedition is intended to be purely a summer one, but it will nevertheless be provided with provisions for fourteen months. A few years ago such a project would have been considered impracticable, but recent voyages of Norwegian whalers, among whom should be mentioned Captain Johannessen, who by his circumnavigation of Novaya Zemlya has gained the gold medal of the Swedish Academy of Sciences, have proved that the difficulty of navigating those seas is not insuperable.

The Seal Fishery.—The Dundee vessels have returned from the sealing at the edge of the ice, and report it to have been the poorest that has been known for years. The new 'Arctic,' commanded by Captain Adams, made the ice in 72° 30' N., and afterwards went as far as 74° N., without seeing any seals, and he learnt that all the other vessels had been equally unsuccessful. At last, on the 5th of April, when in company with three other steamers, they came upon a large patch of seals, and the slaugh-

ter continued for three or four days, after which scarcely any remained alive. The 'Arctic' killed 13,000 seals (130 tons of oil), the 'Polynia' 4500, and the 'Ravenscraig' 4000. In returning the 'Arctic' had to bore through 150 miles of young and old ice, and reached Dundee on April the 18th. But most of the steamers returned "clean," that is without any seals; and the necessity for establishing a close season has become more pressing than ever. There were no less than thirty-nine foreign vessels without a seal. Last year the value of the seal fishing was computed at 30,600*l.*; and this year it is not expected to be 15,000*l.*

Obituary.—KARL MAUCH, the German traveller, died on the 4th of April, at Stuttgart, from severe injuries received through a fall from a window, and after eight days' intense suffering, aged thirty-eight years. The deceased had devoted several years of his life to the exploration of the country between Natal and the Zambezi, and it is to him we are indebted for the discovery of extensive gold-fields, and of the remarkable ruins of Zimbaœ. The results of these travels have been published in Petermann's *Mittheilungen*, but up to the day of the fatal accident which terminated his life Mauch was engaged upon a more comprehensive account of his labours.

WINWOOD READE.—Mr. Winwood Reade who died on Saturday last, the 24th of April, in his 37th year, is known to geographical science chiefly as an enthusiastic African traveller. He visited the West Coast for the first time in 1862-63, and again in 1868-70, when he penetrated into the interior from Sierra Leone, and established friendly relations between the Government of that colony, and the native powers to a distance of 450 miles from the coast. He fixed the source of the Niger, which rises in the same family of mountains as the Senegal and Gambia, and discovered a new route from Sierra Leone to the Niger. His name is also known for several interesting works of travel, such as *Savage Africa*, *The Martyrdom of Man*, and the *African Sketch Book*. His early death is much to be deplored, in so much the more as it was due to physical enfeeblement incurred while accompanying the Ashantee expeditionary force as special correspondent to the *Times*.

An Universal Catalogue of Geographical Works.—We beg to draw the attention of our readers to a most excellent classified list of recent geographical works, papers and articles, drawn up by Herr Koner in the last *Zeitschrift* of the Berlin Geographical Society. The list is framed somewhat in the style of our own and Dr. Petermann's "Table of Contents" in the *Geographical Magazine* and *Mittheilungen* respectively. Every contribution to geographical knowledge which appeared during the year ending November, 1874—be the language what it may—appears to have been faithfully recorded. Such a catalogue is a much needed want, and if its author would endeavour to work *backwards* as well as forwards, and make the catalogue, in process of time, one for all ages, he would achieve a most valuable work. As it is he will deserve the gratitude of all geographical students.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of March 22nd, 1875.

BRITISH BURMAH AND WESTERN CHINA.

THE PRESIDENT, SIR HENRY RAWLINSON, took the chair at 8.30 P.M. The paper of the evening was "Trade Routes between British Burmah and Western China," by J. Coryton.

Ever since the opening of the canal at Suez, the question of a direct road from the Bay of Bengal to Western China has been receiving increased attention. The revolution achieved by the use of steam, now in general use in Eastern waters, has rendered us impatient of delay in travel; the merchants of India and Indo-China declare their ports to be suitable emporia for China trade, and merchants at home listen willingly to any schemes by which the dangers of the China seas are to be eliminated from their calculations. Although the subject in this form has but recently attracted the attention of the public at home, the Government of India has, for the last half century, omitted no opportunity of gaining an insight, through actual inspection by competent officers, into the disposition and resources of neighbouring States, and the facilities afforded by the formation of the country for the establishment of routes which should "tap" Western China.

In the absence of regular surveys of the country it is proposed to cross, we must still rely on history for our conviction that no obstacles arising out of the physical conformation of the country exist. For five centuries, if we can credit the chronicles of Ava, trade was maintained between Burmah and China by way of Bamó, and enormous armies have from time to time swept, in their career of devastation, along the very tracks we are hoping to see traversed by caravans of traders. Our ignorance of the physical character of the broad belt of country we are desirous of traversing is therefore of small moment, and our maps give us, no doubt with sufficient accuracy, the position of the leading mountains, rivers and towns. It is our ignorance of the political status of the population we have to deal with that constitutes our real hindrance, and has hitherto caused the failure of our attempts.

Now it so happened that it was my duty for some years to speak with authority—I will not say with confidence—on this very subject of the geographical boundaries of States adjacent to British Burmah. In the Court of the Recorder of Moulmein, suits were continually before me involving rights to timber felled on the banks of the Salwín, far above British jurisdiction. Each party claimed to have acquired his rights by purchase from the Forest Chief. Finding the difficulty in which I was left from all official recognition of neighbouring states embarrassing, I stated a case for the opinion of the High Court of Calcutta, and the opinion of that Court was that I was bound to determine, as a fact, who was sovereign in the locality in which the timber had grown. The result of having to take judicial cognisance, for this purpose, of the petty skirmishes constantly occurring in the forest districts where the rudest state of society prevails, was, as may be supposed, occasionally absurd. As a rule it would be difficult to define these petty sovereignties more exactly than by saying that the chiefs admit in every case some sort of allegiance either to China, Burmah, or Siam, and, as was evident from the careful records of the exploration on the Mékong in 1868, not unfrequently to more than one at the same time.

There is one characteristic of the people inhabiting the belt of country we are considering, which tells either in favour of or against our scheme in precise proportion

as the country is tranquil or disturbed. I refer to their love of a wandering life, which makes of the Shan an admirable trader when law and order are prevalent, but a very unpleasant neighbour in cases where the country is unquiet. One of the great objects of our Government in Burmah has been to counteract this restless spirit; and in his last report, the Chief Commissioner of British Burmah notices with satisfaction the fact that the hill-tribes of Northern Aracan had been undisturbed by the raids of trans-frontier tribes during the year, and that the condition of the tribes within our territories had continued to improve, in consequence of the comparative quiet there existing.

Mingled with the motley population of Shans, in the belt of country south-west of Yunan, is one element of which we may regard the increase in the neighbourhood of Bamó and Mandalé with great satisfaction. I refer to the Chinese, who, having left their country as emigrants from the Eastern ports, have gradually established themselves as coolies, cultivators, and traders along the coast of the Malay Peninsula from Singapore to Rangoon, and so up the Irawadi to the very spot to which we are hoping their brethren will come overland to meet and trade with them.

To the obstacles arising out of this political chaos existing outside Western China, we may add the utter disruption of society within it, the consequence of civil war. In 1855 the Province of Yunan rose in rebellion, and sustained its independence under a Mussulman governor until 1873. During the period of this rule, bands of marauders, under petty chiefs, devastated the country on the frontier, and harried the few unfortunate traders that crossed their path to an extent which threatened to annihilate all trade.

If Tali, the citadel capital of Western Yunan, to which almost all the routes converge, be, as has been supposed, the Yachi of Marco Polo, the character and religious belief of its inhabitants have been for centuries in opposition to that of the rest of China. Writing in 1595, he describes them as a mixture of "idoltrous native, Nestorian Christians, and Turks." During the last few years of Sultan Soliman's independence, Tali was the centre and key of the rebel power. Soon after the outbreak of the rebellion, the Musulman troops attempted to push their successes southwards, but met with a repulse from the Tsaubwa of Kiang-tong, and retreated, laying waste the towns of Esmok and Yunan Sen. For ten years the rebel power was confined to the northern portion of Yunan. It was at this time, just as fresh exertions were being made to extend it southwards, and we ourselves were prepared to believe that the rule was permanently established, that it suddenly collapsed.

Mr. Coryton then enumerated the various routes which have been attempted or proposed, with a view to developing the resources of Yunan and shortening the transit of goods from thence to Europe. As this very subject, however, was dwelt upon by Colonel Yule, in his article "Trade-routes to Western-China," in our last number we will do no more than specify the routes referred to by Mr. Coryton. These were:—1. Cooper's project for entering Tibet from the Brahmaputra. 2. From Sudaya on the Brahmaputra to Bamó. 3. Route from Calcutta to Bamó *via* Munipur. 4. Akyab route to Mandalé. 5. The Irawadi route to Rangoon. 6. Sprye's route from Rangoon to Kiang Hung. 7. Route through Toungoo to Rangoon by canal and rail. 8. Various routes starting from Moulmein. 9. The valley of the Menam. 10. The Mekong or Cambodia River. 11. The Songkoi or river of Tong-King. 12. The Sikiang, and 13. The attempts from Shanghai to march directly westward on Taliu and Bamó. With reference to the extent of the present trade, Mr. Coryton made the following remarks:—

The extent of the trade that now actually exists between the seaports of British Burmah and the interior will, I think, surprise those who are not acquainted with the subject by personal inspection. I was assured by

one of the leading native merchants of Moulmein, that the value of the piece-goods, with which our hardy visitors, the Shan pedlers, trudge back to their homes yearly, is not less than a lac (10,000*l.*), while respectable Surattee merchants had assured me that it rarely falls below 30,000*l.*, or two-thirds our entire imports of this class. The amount varies, no doubt, within large limits. Under favourable conditions, that is to say, when tranquillity prevails upon our frontiers, it attains considerable dimensions, while disturbances have an equally powerful effect in the opposite direction. It is extremely difficult to obtain anything like trustworthy statistics with reference to the primitive trade thus carried on, the traders being apprehensive that if their profits were known to the Government, they would be subjected to taxation. The number of Shan residents, both in Rangoon and Moulmein, is very large, augmenting and decreasing in proportion to the tranquillity of the times. The numbers stood for Moulmein as high as 4859 in 1865. Owing to the troubled state of the adjacent territory of Karennee, it fell shortly after to 966.

Mr. T. T. COOPER said that from Burmah to China *via* Bamó, the trader has to cross three large watersheds, those of the Salwin and the Cambodia. The country is extremely mountainous, and but sparsely inhabited by semi-barbarous tribes, who have not a very keen appreciation of the blessings of civilisation following on trade, but are nevertheless somewhat given to a little peddling. Mr. Coryton had omitted one point of great importance in dealing with the question of the trade-routes. To warrant any expectation of a large trade, a numerous population is necessary; but although the province of Yunan is undoubtedly rich in minerals, the soil fertile, and the people industrious, internecine warfare has so diminished their numbers, that at the present time grass and ruin may be said to cover the luxuriant soil of the country. Hereafter, when the great vitality, which is characteristic of the Chinese, shall have had time to assert itself, and emigrations shall have taken place from the north-eastern provinces to the more fertile west, trade may be expected to arise between Burmah and Yunan. He did not, however, believe that this would happen during the present generation. The geography of the country between Manwain and Bamó is very interesting. The mighty rivers which flow through the wall-like mountains, and the hills which afford a habitation to the semi-barbarous tribes, are very beautiful. The flora of those hills is purely tropical, the bamboo being most conspicuous. In the higher altitudes, however, many English shrubs and trees are found, such as the gooseberry, the strawberry, and the oak. The fauna is peculiar to those hills. There are animals there which are to be found in no other parts of the world, the most conspicuous being the Takin, belonging to the deer family, and the Mhiton, a sort of wild cattle, somewhat resembling a cross between the buffalo and the bull. Mr. Coryton, probably inadvertently, referred to the Shans as a barbarous people; but they have a literature probably as ancient as that of the Chinese themselves. They were the people who first forged the link of trade between China and Burmah. They, however, were to blame, for having introduced the poppy from Burmah into China. Until they introduced it to the Chinese merchants who visited Yunan annually, poppy cultivation and consumption was unknown in the west of China.

Sir GEORGE CAMPBELL said the country had sustained a great misfortune in the loss of that enterprising and excellent young man, Mr. Margary, while he himself had personally to deplore the death of Lieut. Holcombe, who had fallen, with forty other British subjects, whilst engaged in the exploration of the country between Assam and Burmah. As Mr. Coryton had said, the routes from Assam to Burmah were of only secondary interest until free communication was established between Bamó and China. What Mr. Cooper had said of the depopulated state of Yunan, showed how advis-

able it was to direct attention at present chiefly to the more northerly route, by which direct communication might be obtained with the large and important province of Sze chuan by way of Batang. The late Duffla Expedition had obtained considerable information with regard to the hill-country to the north of Assam, but the tribes there were very barbarous. The route by the Mishmi country was so far well known, that only political obstacles now intervened to prevent direct communication between Assam and Batang, and through Batang with China. Of late years a very much greater intimacy than formerly existed, had sprung up between the English and the frontier tribes, and the Mishmi had become amenable to British authority to a great extent, so that there would be no serious difficulty to encounter in sending travellers through their country, if the Chinese would only let them pass on the other side. The policy of the Chinese was that of civil exclusion; but if through the influence of the British Resident at Peking, or in any other way, permission could be obtained from the Chinese for travellers to enter by the Mishmi route, a communication could be established with the province of Sze-chuan.

Sir RUTHERFORD ALCOCK thought there were many cases in which it was impossible to separate geographical from political considerations, and the question of a trade-route between India and China was just such a case. Sir George Campbell had justly said that, as regards access to the richest and wealthiest part of China, Szechuan, through the Mishmi country, the difficulties presented by the physical character of the country were as nothing compared with those caused by the exclusive policy of the Chinese, and their determination, so far as England was concerned, to prevent entry into their country except by the seaboard. There could be no doubt that, quite consistently with international rights and law, England could say to the Chinese Government, "We have a treaty of amity and commerce with you, by which we have free access to the interior of your country from the seaboard; and it is an act of hostility on your part to pre-emptorily forbid us access from every other direction." This was a ground of complaint which might be very fairly taken whenever Her Majesty's Government thought the time was come to press their rights. The late tragic incident only showed with greater certainty, if such proof were needed, that both on the part of Burmah and of China, there was a decidedly hostile animus, and a determination *per fas aut nefas*, by force or diplomacy, to prevent England from gaining any fresh access into the interior of China, or opening any trade-routes in that direction. Mr. Margary was personally known to him (Sir R. Alcock), and there was no more promising officer in the Consular service. Everyone who knew him must lament that he should have fallen in what was a perfectly hopeless effort, under present circumstances, to penetrate through the hill tribes occupying the border lands between Burmah and China. Those tribes recognised the authority of China, Burmah, or Siam, whenever they were in danger of punishment, but at other times they were independent of all control; and it would be as difficult to hold Peking responsible for anything they did, as to show that Burmah had any direct action in the unfortunate events that had taken place. During the last twenty years a great deal had been said about the importance of opening trade-routes which had occurred showed that the British Government, as an Asiatic power, should be very careful how they entered upon such expeditions. In other countries it might be advisable to risk valuable lives for an adequate object, if failure merely meant the failure of that particular enterprise; but England could not afford to risk a failure among Asiatics. Our empire there was an empire of prestige, and it was absolutely essential that we should not accept defeat, or permit a rebuff. He could therefore well understand the reticence that

had been shown by successive Governments of India on these matters. If the merchants and pamphleteers who were so eager to urge on the Government to these risky explorations, would regard the difficulties in the proper light, they would not be so ready always to blame those who hesitated before undertaking such expeditions.

The PRESIDENT agreed in the main with Sir Rutherford Alcock's remarks, but not entirely. England must risk something, and, on the whole, both from feeling and experience, he would rather be over-risky than over-cautious. No doubt there were serious considerations to be taken into account, and it behoved a Government to feel its way as much as possible; but he could not feel at all dispirited or discouraged by what had taken place recently. No doubt the loss of Mr. Margary was a very melancholy affair, but the Chinese Government had accepted the mission, and given every facility in their power for its passage through the country. Mr. Margary had actually passed through the length and breadth of China by the very same route which the mission was to follow subsequently. Some of his letters written by him after his arrival at Bamó had already been published in the *Times*, and in the last letter, dated January 17th, after he had apparently passed through all his dangers, and had joined Colonel Browne's party at Bamó, he expressed the greatest joy at the happy result of his journey. It was very sad to reflect that within a week of that time he was no more, and everyone must sympathise with his bereaved family, and deplore the irreparable loss which not only they, but the public service had sustained. With regard to the trade-routes, although those to the east might be the easiest available for commerce, still they could never compete with those to the west, because these latter avoid all the dangers of the Chinese seas to which the eastern routes are exposed. At present the French had two routes at their disposal, one from the north of Tong-King up the Songka River, and the other from Saigon up the Cambodia River; but after arriving at the embouchure of either of those rivers, the trade would have to encounter the danger of the Chinese seas. The essential object must be to start from the Bay of Bengal, and therefore the great question was whether the route should be by the Irawadi or the Salwin. Mr. Coryton had stated that the Salwin is not navigable; consequently, until a railroad was formed in that direction, that route was out of the question. At present the Irawadi, however, could be ascended by steam-boats without any difficulty as far as Bamó, and from there to Mômein, the key of Yunan, the distance was only 120 miles. Major Sladen calculated that it could not be more than 130 miles by a circuitous railway. That route accordingly appeared to be the most practicable; but, on the other hand, the tribes inhabiting the Kakhien Hills were exceedingly troublesome and difficult to manage. Major Sladen had sufficient experience of them formerly, and probably the death of Mr. Margary would be traced to the same source. In the mean time all that could be done was "to labour and to wait." It would of course be injudicious to press matters to an undue limit, but a certain pressure ought to be kept up by public opinion, without which all governments were apt to go to sleep.

Meeting of April the 12th, 1875.

WESTERN AUSTRALIA.

Sir HENRY RAWLINSON took the chair at 8.30 P.M. The first paper was a "Journey across the Western Interior of Australia from Murchison River to Peake Station," by John Forrest, F.R.G.S., who with his party left Champion Bay on the 1st of April 1874, to examine the heads of the Murchison and the Gascoigne, and also to try and discover any territory which might tend to the good of Western Australia. After undergoing terrible hardships owing to the scarcity of fresh water, and the wretched barren state of the country, Peake Telegraph

Station was reached on the 28th of September. This six months' journey is a continuous record of sandhills, covered scantily with spinifex grass and little or no water, and nothing was discovered to warrant the belief that settlement can be extended in this direction. In longitude 127° a much better country was entered; and if the season had been different, even with the wretched spinifex desert through which they passed, it is believed the expedition might have got farther north; but all attempts were unavailing, and at last a return journey was made. In latitude $26^{\circ} 11'$, longitude $128^{\circ} E$, where there was a most splendid spring, many hundreds of natives were seen, and they were very numerous in the worst spinifex country in which much game existed. Mr. Forrest and his party were attacked by the natives three times, and they were compelled to fire on them in order to drive them off.

The PRESIDENT explained that the paper just read was only a very brief summary of Mr. Forrest's account of his journey. The detailed journal and map would be published in the *Journal* of the Society. A letter had recently been received from Mr. Forrest, stating that he was on his way to England and would arrive in the month of May, bringing his journal and map with him. He had performed a very extraordinary journey under great difficulties, and, although he had not succeeded in finding any land available for sheep-runs, or other colonial purposes, he still deserved very well of the Geographical Society and of all lovers of geography, for having been the first to traverse that part of the Australian Continent. It was something, at least, to discover that the country was not available for agricultural or pastoral purposes, because that would save further attempts at explorations in quite an impracticable tract.

Sir GEORGE BOWEN (Governor of Victoria) said, as an old Fellow of the Society, he was very much gratified at finding himself once more at one of the Meetings. He had been sixteen years absent from England as Governor, first of Queensland, then of New Zealand, and now of Victoria. Victoria was the smallest in size, but the most important and richest of all the Australian colonies, having a revenue of 4,500,000*l.*, which was much larger than that of the kingdom of Portugal, twice as large as that of Denmark, three times as large as that of Saxony; a revenue, moreover, which was raised only in a small degree by taxation. It was derived chiefly from the public lands, and from the State railways and waterworks. The taxation was only about the same sum per head as in England, namely, about 2*l.*; and of the money actually raised by taxation one-third was spent on public education, including not only primary and secondary schools, but the University of Melbourne, and schools of mines, schools of design, schools of art, and other literary and scientific institutions. When he last had the honour of dining at the Geographical Club, and attending a meeting of the Society sixteen years ago, just before he went to Queensland, his late lamented friend, Sir Roderick Murchison, was in the chair. He congratulated the Society on seeing the chair now filled so ably by a statesman as well as a geographer. He had never been in Western Australia, except when he touched King George's Land in the steamer in passing to and fro from England, but the two Messrs. Forrest dined with him at Melbourne just before he left. They were in perfect health and condition, in spite of all the hardships which they had undergone, and they were both in earnest hope of the recognition which they were now receiving from the Royal Geographical Society. He had had no personal experience of the interior of Western Australia, but he was for eight years Governor of Queensland; the position of which, on the East Coast of Australia, corresponded with the position of Western Australia on the West Coast. He went to Queensland as the first Governor of the colony in 1859, and Sir Charles Nicholson went with him as first President of the Council. On his arrival he found the large and munificent sum of 7*l.* in the public chest; and some

thief, supposing, perhaps, that he had brought with him a sum of money to the colony, broke into the chest, and stole the 7*l.* the first night he was there. During his eight years' administration in Queensland, that sum of 7*l.* swelled into an annual public revenue of 800,000*l.* When Sir Charles Nicholson and himself first went to Brisbane, the only settlement between Brisbane and the Gulf of Carpentaria was Rockhampton, about 500 miles to the North of Brisbane; but, at the present time, there were settlements the whole way to Cape York, 1200 miles to the north; and he hoped that Western Australia would similarly progress. Of course Western Australia had not the same great resources in arable land, in land fit for sugar and for cotton, and in gold-fields, which Queensland possessed; but still Western Australia might follow the example of Queensland, and he hoped that, fifteen years hence, some Governor of Western Australia would be able to give as good an account of the progress of that colony as he himself was able to give of the progress of Queensland. People must not be deterred by the unpromising appearance which the interior of Australia presented to a first explorer. There was a time when everybody said that Queensland was too hot for sheep, and now there are 11,000,000 of sheep in the colony. They must not, therefore, jump to the conclusion that, because a country appeared unpromising, sheep would not flourish there. In Queensland the flow of pastoral occupation had gone on almost like the flow of the tide. At the end of every year some 200 miles had been added to the domains of Christianity and civilization; and in the course of five or six years pastoral occupation had spread over the whole of that vast territory, three times the size of the French empire. Such were the triumphs of peaceful progress. They were triumphs in which Englishmen might well rejoice, for they were victories without pain or bloodshed. Their conquests were not only over men but over nature: not for England only, but for all the world; not for this generation simply, but for all posterity.

Mr. LEAKE (Speaker of the Legislative Council of Western Australia) said he had on the previous Saturday received a letter from Mr. John Forrest, dated from "the high seas of Bombay," in which he said, "Tomorrow I hope to land there, and I am on my way to England. I shall, therefore, travel through Egypt, staying there about a week, but I hope to be in England very nearly as soon as this letter." Mr. John Forrest was a native of Western Australia, and when he arrived in this country he (Mr. Leake) hoped to be able to give him the benefit of his own three weeks' experience in England. When he heard that Mr. Forrest was so near this country, he called upon the Geographical Society to inform them of the fact, and he had hoped that it would have been his privilege and honour to introduce Mr. Forrest to the Society.

EASTERN AFRICA.

SIR HENRY RAWLINSON said that the second paper, entitled "Journey from the Pangani, *via* Wadigo, to Mombasa," was by the Rev. Charles New, who was well known to the members, but who had, he regretted to state, lately died.

Dating from Mombasa, East Africa, Sept. 3, 1874, the Rev. Mr. New stated that he had accomplished a journey from the River Pangani through Usambara onwards, by way of the Wasegeju and Wadigo to Mombasa. The Pangani is a large body of water, with low but fertile banks, which the Arabs and Wasuahili are cultivating on both sides, and, of course, by slave labour, any number of slaves being easily procurable. The Pangani cannot be ascended above Tongue on account of falls, which are reported as being very fine, and the roar of whose waters can be heard at a distance of 2 miles. Two marches from Tongue brought Mr. New and his party to the south-western foot of the Usambara Hills, the Ruvu, as the river is here called, being very near on the left. Beyond this the river splits

up into many parts, forming a kind of irregular chain-work, a number of small islands being the result, upon which the Wasegua have built their villages, thus securing themselves against the attacks of the Masai, who, bold as they are, hesitate to pursue their prey across deep water.

The Wasegua are a numerous, interesting, and well-to-do people, following both pastoral and agricultural pursuits. They occupy the district lying between the coast people and the Ruvu on the one hand, and the Wasagara and Wanugú on the other.

The sixth stage from Tongue found the party at Makuyuni, where they halted, in order to send messengers to Samboja and Kimweri, and to inform them of their desire to meet them, Samboja informing them the third day after that he would meet them at Mombo, about midway between Vuga and his own residence, for palaver, which arrangement they complied with, and found Samboja seated outside a poorly stockaded village, beneath a large tamarind tree, and surrounded by 300 of the wildest-looking fellows, each armed with a flint musket, and most with a sword of some sort. On learning the errand of the expedition, Samboja informed Mr. New that he could not go to Vuga, that he could not see Kimweri, his son; but was to follow him to Masinde, which he did.

The way to Vuga from Masinde was in a backward course S.E., and the march between the two places turned out to be a very hard day's work. Midway between the places the mountain's side was faced, and the ascent began. It was extremely stiff climbing, and for the men and their loads it was cruel work. Up, up, up, and then down and up for three hours, Vuga was at length approached. Vuga is built upon the very top of a rounded peak, some 4700 feet, by aneroid barometer, above the level of the sea. Valleys drop down to great depths on all sides of it, and it can only be reached by the steepest acclivities. The prospect it commands is very fine. There are mountain peaks, the loftiest of which cannot be less than 7000 feet above the sea level, presenting every variety of shape, ridges upon ridges rising one above another till lost in the skies, rocks and crags, and "threatening steeps" *ad infinitum*, enormous valleys, gloomy ravines, and glens as romantic as Glencoe; also dark majestic forests, compact woods, wildernesses of brown jungle, expanses of tall, waving grass, beautiful slopes of short, green turf, and everywhere patches of cultivated land, fresh and verdant as an Eden; brooks, and streams, and torrents trickle and murmur, tumble and splash, and roar on all sides.

Among the picturesque beauties of the neighbourhood of Usambara, is a lake to the north-west of Masinde, which, according to the natives, is about 9 miles in length and one-third or less in breadth. It is called Mangu. It derives its waters from the north-western portion of the Usambara Mountains, and sends off its surplus by the Mkomazi into the Ruvu.

The soil in the neighbourhood of Vuga is a deep red, and the rocks are granite and quartzose. But the stream, taking its course round the north side of Vuga, flows over beds of sandstone. Coal is said to have been sent from Usambara to Zanzibar; but, although Mr. New tried hard, he did not succeed in obtaining a specimen. The soil is evidently very fertile, and from the constant accumulation of clouds and frequent rains never suffers from drought. Almost anything can be raised here. At present plantains and Indian corn are the staple articles cultivated and consumed by the Wasambara.

The climate during the stay of the expedition at Vuga, with the exception now and then of a few hours at mid-day, was delightfully cool, the temperature being below the malaria-generating point; so that in the opinion of Mr. New, the country presents all the advantages of a sanatorium to the future civilizers of East Africa.

The population of Usambara is not large, and appears to be becoming less and less. The country is in a far

less flourishing state in this respect than it was at the time of Dr. Krapf's visit. This is owing to the intestine feuds which have rent the people into factions ever since the death of Kimweri the Great. The present people of Usambara may be said to comprise three distinct races: the Wakilinde, who are the ruling section; the Wambugu, who look more like naturalized subjects from other parts; and the Wasambara themselves, who are the aborigines.

After a stay of more than a week at Vuga, during which time Mr. New was treated with the most generous hospitality by the young king, Kimweri, whose chief request was that he would obtain for him a score of cannon and a number of men to make gunpowder for him, he took leave of the place, cutting across mountains in a north-easterly direction, passing up fine valleys more than 4000 feet above the level of the sea, ascending ridges and peaks more than 6000 feet in height, and descending to the plain on the northern side of the block.

Their way now ran in a somewhat out-of-the-way course, at first towards Buiti, in the country of the Wasegeju, then to a direct line through the low lands of Wadigo to Mombasa, which they resched in forty-five days after their departure from Zanzibar.

Colonel GRANT said he knew Mr. New personally, and was sure the Society would miss very much the admirable remarks that he was accustomed to send home. He was the only person who had ever ascended as far as the perpetual snows on Kilima-Njaro, and his recent journey was a very interesting one, as it showed that there was a very fertile region in that part of Africa, and that there was a great field for the missionaries. He hoped that some one would be found to succeed him who would be able to do as much as Mr. New had in the way of extending geographical knowledge. Mr. Wakefield, who was still at Mombas, was also a great geographer. He had been longer in the country than Mr. New, and was better acquainted with the languages. He, too, had on several occasions sent home accounts of routes that he had learned from natives who had been far to the westward; and these routes had been published in the *Journal* of the Society, forming very valuable additions to the geographical knowledge of that part of the world.

The PRESIDENT said the route that Mr. New followed from the coast to Vuga, the chief town of Usambara, was very much the same as that followed by Burton and Speke in 1857; but the return route to Mombas was through an entirely new country. Mr. New's loss was a very great one, not only to geography, but to the Missionary Society of which he was so distinguished a member. He was known to have done the greatest good in the cause of Christianity and education among the natives, and his career promised to be most useful in the future.

COLONEL GORDON'S EXPEDITION.

The third paper was a "Report on the Nile above Gondokoro, between Regiaf and Dufli," by J. Kemp, of the Egyptian Expedition under Colonel Gordon.

The Regiaf to Kya River was 42 miles, the country being open, rocky, and undulating, intersected by many mountain streams. It was thickly populated by the Bari tribe, who cultivated it to a large extent, and owned little herds of cattle, which they objected to sell. The first cataract was 12 miles from Regiaf, whilst the second one was seen at the mouth of the Kya River, which river was a good size, flowing from the west. The Arabs and natives said that its rise took place in the Kuku Mountains; its width was from 70 to 80 yards. In the dry season its depth was from 3 to 4 feet, and in the rainy season, in parts, from 10 to 12 feet. Five miles from where it joined the Nile was a fall 50 or 60 feet high. Up to this point the bed was very rocky and the banks steep, being covered with large rocks. Beyond that the country got flat, but the river, as far as was able to be seen, was still rocky. After leaving the Kya River the country was much the same as on the

north of it, but more undulating and rocky, and with fewer streams. Forty miles from Kya they came to Mount Labori, on the east bank. Twenty miles further on another range of hills shelved down to the Nile on the east bank. On the west side the Kuku hills, which had been drawing nearer to the river, were now parallel with and only a few miles distant from it. From this point the mountains on both sides of the river run parallel with it to the head of the cataracts, a distance of about 30 miles. The range on the east bank ran straight down to the river; that on the west was separated from it by a narrow strip of land, covered with high grass and prickly trees, very rocky, uninhabited, and uncultivated. The natives stated that there was only one path. At Dufi the hills on both banks dropped abruptly. From the first view of the Nile on coming out of the grass, there was little doubt that the cataracts were passed. As far as one could see there extended a flat, barren-looking country, covered with palms and a few other large trees.

The PRESIDENT added that Mr. Kemp had been engaged in superintending the conveyance of sections of two vessels past these obstructions, and in putting them together at Dufi, whence it was supposed the river would be navigable up to its outlet from Albert Nyanza. The latest intelligence from Colonel Gordon was, unfortunately, not so encouraging as that received in January last. Mr. Kemp had fallen ill, and was preparing to leave for Cairo. Mr. Linant, who had been preparing to visit King Mtesa, by way of the Somerset Nile, in a steamer, was also invalided. The young engineer officers, Messrs. Watson and Chippendale, were also both ill, and had been obliged to descend from Regiaf to Colonel Gordon's head-quarters, at Lardo; happily, at the latest dates, they were both reported better. These untoward events had delayed the projected expedition to Albert Nyanza, and Colonel Gordon considered that there would be a risk of further illness to the young officers in such a journey, as he believed the country between Ibrahimeya and the lake was marshy. But the Society might be quite sure, from what it knew of Colonel Gordon's character, that he would not give in unless he was absolutely compelled to do so; and it appeared, from a letter from his brother to Colonel Grant, that if other means failed, he was determined to go himself and launch his boat upon the lake. He had been joined by Mr. Marno, of the Vienna Geographical Society, who knows the country well, and was going to the western side of Lake Albert Nyanza. Mr. Marno was an experienced African traveller, so that his co-operation with Colonel Gordon would be very valuable. An African exploring expedition was on the point of starting from Italy, intending to proceed to Shoa, thence through the Galla country, and past Mount Kenia, towards the Victoria Nyanza. It was an exceedingly difficult line of country, but the promoters of the expedition were very confident of success. Within the last week an offer had been received from a German gentleman attached to one of the Egyptian expeditions to Dafur, to communicate to the Royal Geographical Society such information as he could obtain on the route. The prospects of geography in Africa were, therefore, very encouraging, so many different exploratory parties all converging upon the great Lake region.

Colonel GRANT said no previous traveller had been up the side of the river which Mr. Kemp had visited; and the discovery of a new river upon the left bank was a fresh addition to the geographical knowledge of the country. Colonel Gordon, in his last letter to him, mentioned that he had met with great difficulty in getting the sections of his boat up to the west of the river above the cataracts. The natives would not sell any of their cattle, nor assist in conveying the boat up the river. He had, however, organised a corps of coolies for the purpose, and, with their assistance, hoped that Mr. Chippendale would be exploring the Albert

Nyanza within the next six months. Several deaths had occurred in his camp; and he himself, with his assistants, Mr. Watson and Mr. Chippendale, were all suffering severely from fever and dysentery. It was reported that Mr. Watson was coming home. He had the utmost confidence in Colonel Gordon, and had no doubt that he would succeed in his undertaking if his health was spared.

In answer to a question,

The PRESIDENT said the latest news from Cameron was dated May 19th, 1874. The Sultan of Zanzibar had withdrawn his protection of Unanyembe, and the native chiefs, Mirambo and his friends, were now paramount. Whether that would facilitate or obstruct the traffic between the coast and Tanganyika remained to be seen. Some people were of opinion that the change would be rather advantageous than otherwise.

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AMERICAN GEOGRAPHICAL SOCIETY.

CHIEF JUSTICE DALY delivered his annual address to the Society on the 25th of February last. He passed in review the chief geographical events of the year, and noticed in somewhat more detail the various surveying and exploring expeditions which had been at work in the United States during the same period. These last comprise the labours of the Engineer Corps, the Coast Survey, and the Hydrographic Office. Among the first may be mentioned Lieutenant Wheeler's Survey west of the 100th meridian, which during the year covered 75,000 square miles. These extended over the "Colorado plateau" which from its steppe-like table-land, its gorges and cañons is of great interest to the geologist. Every state and territory west of the plains is crowded with the products of volcanic action, ancient and modern, these being especially noticeable in Arizona, New Mexico and Utah. The country in the vicinity of the cañons is of great beauty, and the dwellings of the former inhabitants (probably Aztecs) are of considerable interest, being built evidently with a view to security against attack, on the sides of the cañons or on projecting ledges, rocky elevations, or other places from whence a signal might be seen at a distance. Besides Lieutenant Wheeler, Major Barlow, Lieutenant Ruffner and Captain Jones had been conducting explorations. The latter officer has explored an excessively mountainous area in the north-west corner of the Wyoming, about the head-waters of the Yellowstone and other rivers. Captain Ludlow accompanied Colonel Custer's military expedition to the Black Hills, which were found to abound in timber, pasture and grass, to be wonderful fertile and of a genial climate, and altogether admirably adapted for settlement. Professor Hayden and Mr. J. T. Gardner's geological and geographical survey is noticed in an article by Mr. Southworth in our present number, but a description of one of the ruined dwellings found by the survey in a cañon of the Rio Mancos, a branch of the San Juan, quoted by Justice Daly, deserves mention here. The house was a two-storied one, built of smooth-faced stones, laid in mud mortar, with well-constructed windows, that were formerly glazed with mica. The whole structure showed not only skill but taste, the interior being plastered and the walls panelled in red with a white border. It is built on the shelf of a precipice, about 600 feet above the bed of the river, so as to be secure from the attacks of predatory and warlike tribes to the east and south. The ruins of a fortified city were also discovered to the west of the cañon, the walls being built of stone, and 15 feet in thickness.

Passing on to the doings of other countries, Justice Daly makes some important remarks with reference to M. Pinart's geographical and ethnological investigations in Alaska and the Aleutian Islands. This work, as our readers may remember, gained for him the gold medal of the French Geographical Society. The Chief Justice remarks—"Of his geographical labours or knowledge I cannot say much in commendation. He

has claimed as his discoveries and given names to places already existing upon Russian maps, and which are found upon our own charts in 1846, and the archipelago which he has named after the statesman Thiers, excepting what was already known, does not exist.* His ethnological researches are entitled to more consideration." In noticing M. Pinart's work, reference is also made to Mr. Dall's more recent labours, which, during the past year, were carried along the coast from Cape Spencer to Mount St. Elias, the whole of which has been examined, and many grave errors detected. The coast was found to extend from 4 to 7 miles further west than as delineated upon the present maps. The region is one of extensive glaciers, which have been examined and mapped for the first time. Twenty-four positions were determined, seventeen manuscript surveys made, and about 12,000 astronomical, magnetic and miscellaneous observations taken. Some curious caves previously explored were re-examined, new shell heaps have been found, and many thousands of ethnological specimens were brought to Washington, where, in McFarland, Kennicut and Dall's collections there is a finer collection of ethnological material relating to the Western Esquimaux than in all other collections of the world put together.

Justice Daly added, that as the Society took a very active part in urging the negotiations on the part of Mr. Seward for the purchase of Alaska, and as there were many who thought a very large sum was being paid for a useless territory, it was gratifying to be able to state that the income now derived by the Government from this territory, after payment of all expenses, is greater than that from any other territory, and will in twenty years extinguish the debt. The southern portion, of Alaska has a comparatively mild climate, and is capable of maintaining a large population. Potatoes, barley, rye, and probably oats can be cultivated, its agricultural resources being about the same as Norway or the Orkney Islands. It is an immense timber region, with great facilities for transportation, and will continue for a long time to supply the products of fur-bearing animals, provided this branch of industry is properly protected.

The remainder of Chief Justice Daly's address dealt with matters which have already been recorded in our columns.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

THIS Society met on the 5th (17th) of March, under the presidency of M. P. Semenof. An obituary notice of M. Timkofsky was read, a member who had recently died at the age of eighty-five, and, who in 1820 and 1821, travelled in China, and had published an account of his travels which even now is considered a standard authority on the country referred to.

The SECRETARY, M. WILSON, then read his monthly report, in the course of which he announced that, on the recommendation of their august President, the Emperor had sanctioned a grant of 10,000 roubles to the Society, towards the expenses of the Russian department at the approaching Paris Geographical Congress. The Committee appointed to consider the scheme for the projection of various lines of levels in Siberia, had nearly completed their report. Among recent accessions to the library were mentioned the last volume of M. Middendorf's great work on his Siberian voyage, and a map of Australia prepared by Baron Kaulbars.

M. BARBOT DE MARNY gave an account of his geological researches last year in the basin of the Amu Daria. The delta is chiefly composed of a grey clay, while on the right bank calcareous formations extend as

far as the Bokharian frontier, the same being perceptible on the slopes of the Sheik Jheli range, which consists chiefly of schists, marble, gneiss, and granite. Deposits of grey clay are also found in the Khivan oasis. From the Amu Daria to the Kizil Kum Desert which M. Barbot de Marny traversed from Petro Alexandrovsk to Samarkand, there is no trace of marine deposits or of water in any form having existed there in any recent geological age. The hills in this desert are formed chiefly of schist and chalk, volcanic action being rarely traceable. All the mountain chains must be considered as belonging to the great Tien-Shan range.

After the election of some new members, the meeting concluded.

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FRENCH GEOGRAPHICAL SOCIETY.

Bulletin for January.

THIS number contains an interesting notice of the Abbé Armand David, and of his journeys in China and Mongolia, more particularly with reference to his journey in 1866 from Peking eastward to the Alachan country, the first portion of which is given here, and illustrated by a route-map. We propose to give our readers a summary of this journey on receipt of the concluding account. Other articles are, a dissertation on an international meridian of longitude, by M. Otto Struve, director of the Pulkhova Observatory, urging the adoption of Greenwich; an essay on Poncet's and other French travellers' explorations in the regions of the Upper Nile; a letter explanatory of a geological map of France, lately presented to the Society; some communications from M. Duveyrier on the subject of his levelling and surveying operations in Algeria; and the Address, delivered by the President at the annual opening meeting of the Society on the 16th of December 1874, as well as the proceedings at two subsequent meetings.

We regret to say that the *Bulletin* for February has not reached us at the time of going to press.

Bulletin for March 1875.

THE first article in this bulletin is a geographical memoir of Herzegovina, a province of European Turkey, and this is followed by some notes on British Burma and on the Shans and Kakhyen tribes of Burma Proper, by Count Marescalchi. A French missionary contributes an interesting account of the province of Thank-hoa, in Tong-King, from which we gather that it is shut in by mountains on the north, west, and south, is well watered by nature, and boasts of a population of about 1,200,000, of which about 15,000 are Roman Catholics. Rice, cotton, sugar, tea, maize and the betel-nut all thrive, but agriculture is not so favoured as the utilization of timber, some valuable kinds of trees, such as ironwood, being plentiful. All the fruit-trees met with in Tong-King abound here, as does also cinnamon, the monopoly of which, on account of its great value as a tonic, and in cases of ophthalmia, is vested in the hands of the king, severe penalties being enacted against any one breaking off the smallest branch. Nevertheless, its value is so high, fetching, as it does, sometimes 100 francs per ounce, that a deal of contraband traffic in it goes on. A good trade is done in ivory by the Chinese resident in Thank-hoa, and along the coast fishing is actively pursued, while at Cua-bang the story goes that pearls of great value were formerly to be found. From December to March the same seaport is visited by shoals of whales, which are the object of superstitious veneration on the part of the natives, who have erected a handsome pagoda on the bank in their honour, and who inter them with solemn funeral rites, in case a dead one is washed ashore. One of the most remarkable sights is the remains of the fortress of Tay-Giai, in the north-west of the province. It was built

* This reminds us of the old criticism—"We have found much that is true and much that is new in this work; but what is true is not new, and what is new is not true."

about 400 years ago, but abandoned a few years after its completion under the idea that it had brought misfortune. It is a square, encircled by lofty walls composed of solid stone blocks, each side being furnished with an entrance paved with marble. Many of the stones have been taken away by the inhabitants, but it is still an imposing structure, and unique in its way, all other edifices being invariably of brick.

TONG-KING.

Dr. HARMAND contributes a short account of Tong-King in which he dwells upon its advantages as a sanatorium and refuge for French colonists from the unhealthy climate of Saigon, and points out that the climate of Tong-King is especially favourable to the growth of coffee. The interior ranges of mountains are visible from the delta of the Song-koi, and Dr. Harmand imagines that they extend to the borders of Tibet. Zinc, copper, and silver mines are there to be found, according to native accounts, and coal exists to the north of Bac-ninh. The Song-koi flows along a narrow valley, and after passing through countries which are wholly unknown to Europeans, and a belt of forests about 80 miles in width, flows by the port of Hanoi, after receiving two large affluents. The Song-koi has a tawny colour, which gives it the name of Red River. It is subject to great variations of level, its highest period being in July, when it inundates the surrounding country and flows with a powerful current, and the lowest between November and March. Flat-bottomed boats will probably be required for navigation, and the mouths and approaches are now being carefully surveyed. On their first visit the French travellers were struck with the density of the population, the fertility of the country, which appears here to be a succession of rice-fields, and the absence of junks, boats, or any sign of commercial activity. This is probably due to the fact that the country grows only sufficient for its requirements, as it is heavily taxed to make up for the sterility of the rest of the Annam empire. Vegetables are largely cultivated, but the French anticipate growing colonial products of a more remunerative character. Besides the numerous water-ways, there are also causeways built above the level of the inundations, and bridges leading from one road to another.

The inhabitants differ but slightly from the Annamites of the south. They are a mild and inoffensive race, and are not as a rule solicitous of any particular form of rule, though they dislike the Hue government, and recall with pleasure the rule of the Le dynasty, when Tong-King was independent. The mandarins are of course strenuously hostile to all Europeans, and to Frenchmen particularly. They are illiberal, cunning, ignorant, and prone to intrigue and exactions. Few would imagine the pitch to which the last are carried. The soldier cannot ask a favour of his superior officer, the pupil of his master, or the peasant of the chief of the village, without a present in his hands. The administration of each province is centralized, each individual's liberty of action being strictly defined and restrained, while the rights of the commonwealth are most extensive. All the grades of office are filled by competition, the highest being the viceroy, after which comes the *bo-chinh*, or official charged with the duty of collecting taxes, maintaining roads, causeways, bridges, and the like, as well as looking after military matters and such statistics as exist. The *ansat* is the minister and administrator of justice, the framer of laws and regulations. This post is generally filled by a person of intelligence and education, who is often the real head of the Government. Lastly, the *doc-hoc* is the minister of education and government examinations. All the departments are congregated within a citadel adjoining the chief town of each province. These citadels are built on Vauban's principles (which were introduced by a French mission sent out in 1786 by Louis XIV.), and furnished with some ramshackle artillery. The garrisons are numerous

but ill-drilled; they are armed with long lances, and some of them have some good flint-lock muskets of St. Etienne manufacture. Besides the regular army, there is a sort of *landwehr*, a force made up by each village contributing a contingent, on being called upon to do so by the mandarins. This service, however, is one of great hardship, as the soldiers receive nothing beyond a few measures of rice, while they have to provide all their equipment, in addition to the usual assortment of presents for every grade of official.

The people gain their livelihood mainly by cultivation, but some practice fishing, pottery-making, and brick-making, the soil being particularly suited for this last industry. Unfortunately, fuel is scarce, Lower Tong-King being poor in trees. Workers in mother-o'-pearl also make a good living, and turn out some very artistic productions. Boats are generally constructed, owing to the dearth of wood, out of strips of bamboo, ingeniously interlaced and smeared over with oil of the diptero-carpus, which comes from Upper Tong-King.

The Chinese generally live in the larger towns where they have decided influence, and engage in commercial pursuits, the avocation of money-lenders being particularly affected by them. Commerce with China is confined to articles of apparel, fancy goods, and drugs. The mountains are inhabited by a variety of savage races, more or less unknown, but who are, doubtless, the aborigines of the country. In the north-west and north there are numerous hordes of banditti, chiefly Chinese, who live by plundering the unfortunate inhabitants and compel them to keep constant guard along the roads and approaches to the towns, which are further protected by palisades and ditches.

Dr. HARMAND concludes his sketch with a vigorous vindication of the memory of Francis Garnier, whom some have falsely accused of greediness and of ambition. The latter quality Garnier certainly possessed, but it was an honest and loyal ambition which it would be well for France if more of her sons possessed.

A letter of Dr. Bessels follows, in which he enumerates the chief scientific results of the 'Polaris' Arctic Expedition, among which the magnetic observations were the most important. Eight sorts of mammals and twenty-three birds were met with, but these collections were unfortunately lost. Dr. Bessels also says that it was impossible for the expedition to have attained a higher latitude in the condition they were in, as the ship had become leaky aft, and quite unfitted for a further exploration.

A review of a new work by M. Gravier on the discovery of America by the Northmen follows. It is pronounced by M. Malte-Brun to be altogether of great interest.

The last article of note in this month's *Bulletin* is a series of letters from M. Duveyrier, who is accompanying Captain Roudaire's levelling expedition in Algeria.

NOTICE.

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Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

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THE
GEOGRAPHICAL MAGAZINE.

JUNE, 1875.

SHERARD OSBORN.

SHERARD OSBORN is lost to us. We may no longer be guided by his advice, nerved to fresh efforts by his enthusiasm, nor cheered by his kind and genial counsels. Henceforward the memory of his brave deeds and wise thoughts will be all that is left to us. But this is much. The example of such a man's life is a legacy which will serve our needs, and which will be a boon to future generations. It will not soon be forgotten. It will live in the traditions handed down by those who have served with him in all ranks of life, and in the pages of his books. His ruling passion through life was love for and devotion to his profession, and all his efforts were centred on the advancement of the interests of the navy in the broadest and most liberal sense. He laboured, both with pen and sword, to secure the efficiency of the navy in time of war; ever taking the lead in promoting all improvements, from the time when he studied gunnery in the 'Excellent' thirty years ago, to the last week of his life when he aided the Duke of Somerset in the preparation of his speech on breech and muzzle-loading guns. But Osborn always felt that the navy had other work than fighting, and that in a long peace her usefulness should be even greater and more lasting than during a period of war. It was his aim to find noble and worthy employment for our naval officers and seamen in time of peace. He maintained that they should take a lead in great enterprises for the benefit of commerce, in surveying, and above all in daring achievements connected with geographical exploration and discovery. It was this feeling that made Osborn a studious and expert geographer, and which induced him to become so active a member of the Geographical and Hakluyt Societies. His whole heart was wrapped up in his profession, and in working at the glorious task of furthering its interests he became a geographer, a telegraphist, and a politician. Sherard Osborn was endowed with rare gifts. To great ability and power of acquiring knowledge he added very remarkable grasp of mind and quickness of perception. But above all he was a true and large-hearted man, utterly incapable of pettiness in thought or act, unselfish and full of warm and noble sympathies. He not only won the respect and admiration of those who served under him and worked with him, but he earned their love and lasting friendship. His faults were those of a generous and noble nature. As a young man his impetuous zeal often carried him away, and led him to say things which created opposition at

the time, and which no one regretted more than himself in after life. But Osborn acquired prudence with advancing age, and the enthusiasm which sometimes overran discretion in his earlier days was guided by caution and kept in due subjection, though still as strong as ever, in after life. His sympathies also became wider and more catholic, and one of the most striking characteristics of his mind was the completeness and fullness with which he entered into the feelings of younger men. His life is one which should be, and surely will be, studied and appreciated by his younger brother officers; for the name of Sherard Osborn is known and respected throughout the navy, and his bright example will encourage many a friendless lad, without influence or interest like himself, to fight the battle of life as Osborn did, and to strive like him, with all his might, to do his duty and advance the interests of his profession.

Sherard Osborn, the son of Lieutenant-Colonel Osborn of the Madras army, was born on the 25th of April 1822. His mother was Eliza, daughter of Sherard Todington, Esq., of Medbourn in Leicestershire; but she died at Boulogne, on December 21st, 1838, and he never saw her after he first went to sea. He received a nomination as first-class volunteer from Captain W. Warren, when he was commissioning the 'Hyacinth,' an 18-gun corvette, and entering the navy on board that vessel, sailed in her for the East Indies early in 1838. Osborn was then in his sixteenth year.

After visiting Bombay and Trincomalee, the 'Hyacinth' reached Singapore on May the 29th, 1838. During the previous monsoon the Malays had driven the Siamese out of Quedah, on the Malacca peninsula, and it was the British policy to restore it to the King of Siam. A plan of the campaign was arranged at Singapore, and the 'Hyacinth' was sent to blockade Quedah and the river Parlis. Captain Warren was lent three lugger-rigged and decked gunboats manned with Malays, to co-operate in the blockade, and young Osborn received command of one of them, the 'Emerald,' on December 8th, 1838. Her armament was an 18-pounder carronade in the bow, and a brass 6-pounder on a pivot on the quarter-deck; and she was manned by a crew of twenty-five stout Malays with a *Serang* or boatswain named Jadee. Thus as a midshipman, and at the age of 16, he took command of his first ship.

It was a proud day for young Osborn. "All was bright and beautiful to me," he says. "Placed, young as I was, in a position of trust and responsibility, enjoying all the sweets of command, and still too

young to feel its anxieties, it was indeed the sunny side of the world that I was then enjoying, and as, with a throbbing pulse and zealous heart, I walked my own quarter-deck, how earnest in all the honesty of youth were my resolutions to deserve well of my profession." It was an exciting and interesting service, chasing piratical *prahus*, hard fighting on shore and up rivers, and many strange adventures. At length, Quedah having been evacuated on the 20th of March 1839, the time came for Osborn to return to the 'Hyacinth,' and he says—"it was not without regret that I bid my crew good-bye; for my first essay as a captain had been a very very happy one; and if ever a set of poor fellows tried to show that the feeling was mutual, it was exhibited in the warm good-bye of Jadee and his swarthy crew." The journal kept during the service in the gunboat was published in 1857, and is one of the best naval books of the present century. Full of pleasant stories and anecdotes and of useful information, *Quedah* is the delight of many a young officer who, like the author, has to struggle up the ladder of naval service. The preface contains a valuable piece of advice. "To a steady habit of journalising," Osborn says, "noting down all he saw, read, or felt, and in spite of defective spelling and worse grammar, still educating himself with his journal, the author is mainly indebted for being able to fight his way up an arduous and emulative profession. This fact he would fain impress upon the younger branches of the Royal Navy; it will cheer and encourage the humble youth who dons the blue jacket, relying on his head and hand to win those honours and that advancement which, in the natural course of things, appear only to have been created for the influential. In practising habits of observation, not only does the officer discover a source of amusement and instruction for himself, but, at some time or other, he may be able to serve his fellow-man, or add, in a humble way, to the fund of human knowledge."

From Singapore the 'Hyacinth' proceeded to China during the first war, and Osborn served at the taking of Canton in 1841. He then joined the 'Clio,' another 18-gun corvette, commanded by Captain Troubridge, and was on shore at the capture of the Woosung batteries and Shanghai on June the 16th, 1842. He was afterwards in the 'Volage,' and returned home in the 'Columbine' in 1843. He was thrice mentioned in the despatches of Commodore Sir Thomas Herbert and Admiral Sir William Parker, and was publicly thanked as a midshipman by Commodore Watson for his services at the capture of Shanghai.

Sherard Osborn passed his examination on the 6th of December 1843, and joined the 'Excellent' as mate, where he passed out, early in 1844, with a first-class certificate as a gunnery officer. He was a messmate, in the 'Excellent,' of several officers who afterwards joined Sir John Franklin's Expedition, Fairholme, Hodgson, Irving, and Des Vœux, to whom he was warmly attached, and these friendships were destined to affect his future career. But in May 1844 he was specially selected as Gunnery Mate of H.M.S. 'Collingwood,' a line-of-battle-ship which was commissioned on the 4th of that month to bear the flag of Admiral Sir George Seymour, on the Pacific Station. The 'Collingwood' was the smartest as well as the happiest ship in the navy of her time. Her captain was the late Admiral Sir Robert Smart.

Her commander was the present Admiral H. Broadhead; and, as regards the officers, it is remarkable that, at the present moment, five of the naval squadrons are commanded by old Collingwoods: namely, the East Indian by Admiral Macdonald; the Pacific by Admiral Cochrane, C.B.; the Channel squadron by Admiral Beauchamp Seymour, C.B.; the Flying squadron by Admiral Rowley Lambert, C.B.; and the Australian by Commodore Goodenough. If Sherard Osborn had been spared to take the command in the Mediterranean, which would have been offered to him, he would have made the sixth. As Gunnery Mate, and, after being promoted on the 4th of May 1846, as Gunnery Lieutenant, Osborn brought the drill on board the 'Collingwood' to a remarkably high state of efficiency. With Sir George Seymour the 'Collingwood' visited most of the ports on the west coasts of South America and Mexico, California, the Sandwich and Society Islands. Sir George Seymour had a very complete collection of narratives of voyages in the South Seas, and Osborn had the habit, which he taught to others, of collecting from them all kinds of information likely to be useful to naval officers respecting each port; thus classifying and arranging his materials on correct principles. He was also struck by the magnificence of the South American rivers as great fluvial highways of commerce, and wrote much on the subject. He was a man who never dropped a point entirely in which he once took an interest, however long might be the time during which he was obliged to put it on one side. As regards the Amazon he afterwards actively and liberally assisted in the editing of the voyages of Orellana, Acuña, and Aguirre; and it is remarkable that finally, as Director of the Amazon Steam Navigation Company, he was at last able to realize the dream of his youth, while serving in the Pacific.

Altogether, the four years on board the 'Collingwood' was a period of preparation for important work in after life, and of admirable training. It was also a most happy time, full of enjoyment and pleasure—storing the memory with bright and pleasant thoughts. Of the 'Collingwood,' as of the 'Hyacinth' days, Osborn would quote the lines of Rogers:—

"Sweet memory! wafted by thy gentle gale,
Oft up the stream of Time I turn my sail,
To view the fairy haunts of long-lost hours,
Blest with far greener shades, far fresher flowers."

The dear old 'Collingwood' was paid off at Portsmouth on the 20th of July 1848, and, after a brief holiday on shore, Osborn was appointed to command the 'Dwarf,' a small steamer for service on the coast of Ireland, during the Smith O'Brien riots. In Ireland he earned the warm approval of the local authorities, and was repeatedly thanked by the Commander-in-Chief. In 1849 his seamanship and gallantry were reported to the Admiralty as "beyond all praise in remaining by his vessel the 'Dwarf,' in a sinking state in tempestuous weather."

But now a matter of deep interest began to absorb all his thoughts, and to call forth the energies of his mind. Sir John Franklin's Expedition had been absent nearly five years, Sir James Ross, who had been sent out in search of it, had returned unsuccessful, and it was urged, in very influential quarters, that Franklin's ships must have gone down in Baffin's Bay,

and that the search should be abandoned. This disgraceful counsel fired the indignation of Sherard Osborn. His whole soul revolted against the shame that would thus be brought upon England, and he saved his country from it. He came forward in the true spirit of chivalry to stand by the cause of his old messmates in the 'Excellent,' of the noble-minded widow of Sir John Franklin, and of his country; and to denounce the false and recreant advice of those who desired to abandon the explorers to their fate. He wrote unceasingly with equal ability and vigour, he inspired others with some of his own enthusiasm, and he gained his point. Before the new year another Arctic search expedition had been decided upon.

Captain Austin's Expedition consisted of four vessels, the 'Resolute' with the 'Pioneer' screw steamer as tender, the 'Assistance,' and the 'Intrepid.' Sherard Osborn was appointed Lieutenant commanding the 'Pioneer' on the 26th of February 1850. He was then in his 28th year.

Captain Austin's Expedition was the most efficient and the happiest that ever entered the Arctic Regions. It was the first in which steam-power was effectively used in ice navigation, the first and only one in which the winter organization was so admirable as altogether to banish sickness, and the first in which the system of sledge-travelling was brought to a high state of efficiency. In all this work Sherard Osborn took a leading share. His steamer was of 400 tons burden and 150 feet long, propelled by a screw with an engine of 60-horse power, and rigged as a three-masted schooner. She carried 300 tons of coal. The crew consisted of thirty souls, of which five were officers. In this steamer Osborn acquired his experience, and it taught him to foresee and to predict a new era in Arctic voyaging. Then all the whalers were sailing vessels. Now every whaler is a powerful screw steamer like the 'Pioneer.'

In the winter quarters his enthusiasm, and his bright and genial disposition added in no small measure to the cheerfulness and zeal of his comrades; and he thus did good service in preparing for the sledge travelling in spring. It is to M'Clintock, the First Lieutenant of the 'Assistance,' that, aided by experience acquired under Sir James Ross, the great credit of conceiving and maturing the system of Arctic sledge-travelling belongs. This was always fully and generously conceded by Sherard Osborn. All the travelling parties started on April 15th, 1851, from the winter quarters off Griffith Island. M'Clintock was away eighty days, and marched over 770 miles. Osborn, leaving the ships with a division commanded by Captain Ommanney, explored as far as the most western point of Prince of Wales Land, and marched 534 miles in fifty-eight days. He gives the greatest credit to the men, whose heroism was beyond all praise. Constant intercourse with them, during this trying journey, did much to raise his opinion of the character and indomitable spirit of our seamen and marines. He said—"On them fell the hard labour, to us fell the honours of the enterprise; yet none excelled the men in cheerfulness and sanguine hopefulness of a successful issue to our enterprise. They had their moments of pleasure too—plenty of them in spite of the cold, in spite of fatigue. There was honest congratulation after a good day's work; there was the time after the pemmican had been eaten; and

each one, drawing up his blanket-bag around his chin, sat, pannikin in hand, and received from the cook the half gill of grog; and, after drinking it, there was sometimes an hour's conversation, in which there was more hearty merriment, I trow, than in many a palace,—dry witticisms or caustic remarks which made one's sides ache with laughter." Osborn's sledge was christened the "True Blue," his motto was *Ni desperandum*.

The Expedition returned to England in the autumn of 1851, having discovered the first winter quarters of Sir John Franklin's Expedition, but leaving its fate as great a mystery as ever. Osborn disapproved of the return, and urged a renewal of the search with as much energy and chivalrous eloquence as before. He published a charming work containing an interesting and complete account of ice navigation, of winter quarters, and of sledge-travelling, which did much to keep public interest fixed on Arctic matters. It is entitled *Stray Leaves from an Arctic Journal*, and was published by Blackwood, 1852. It aided materially in securing the despatch of another Arctic Expedition.

During the short interval of rest in England, between the return of Austin's and the despatch of Belcher's Expedition, Sherard Osborn was married at Paddington, on the 8th of January 1852, to Miss Helen Harriet Gordon Hinxman, daughter of Mr. John Hinxman of Queen Anne Street, the Navy Agent. By this marriage he had two daughters, who survive him.

In February 1852 the four vessels were again commissioned for another expedition, and once more Osborn received command of the 'Pioneer.' He was promoted to the rank of Commander in 1853. His life-long friend, the present Rear-Admiral George H. Richards, C.B., was his comrade as Commander of the 'Assistance.' With the experience acquired under Captain Austin, the presence of Sherard Osborn in the new expedition was invaluable. He passed two very trying winters up Wellington Channel; and in the sledge-travelling he was away from his ship 117 days, and marched over 1093 miles. His energy and joviality, and his readiness to undertake the hardest labour, if any of his men were distressed in dragging the sledge, won him the devoted attachment of his crew.

On his return home in the autumn of 1854, he had been five summers and three winters in the Arctic Regions; a service which, though severe and trying, was ever looked upon by Osborn as the very best training for officers in time of peace. His health had been somewhat shaken, and for a few months he held the appointment of Commander of the Norfolk District Coast Guard, to recruit. During this interval he undertook the difficult and delicate work of preparing and editing Sir Robert M'Clure's logs and journals for the press; which he performed with admirable tact and literary skill. His ardent hope, which has been well fulfilled, was "that the work might remain as the history of a great event in naval chronicles, and perhaps awaken in the breasts of future Franklins, Parrys, or M'Clures, that love for perilous adventure, which must ever form the most valuable trait in the character of a maritime people." *The Discovery of a North-West Passage by H.M.S. 'Investigator,' Captain R. M'Clure, edited by Captain*

Sherard Osborn, C.B., from the logs and journals of Captain M^cClure, was published in April 1856, and has gone through four editions.

But stirring times were now for the navy. The Arctic Expedition returned just as the Crimean War was breaking out, and early in 1855 Sherard Osborn proceeded to the Black Sea, in command of H.M.S. 'Vesuvius.' He assisted Admiral Boxer in restoring order in Balaclava Harbour, and was then sent by Sir Edmund Lyons as senior officer of the blockading squadron off Kertch and the straits of Yenikale. He was present at the capture of Kertch, and succeeded to the command of the squadron in the sea of Azov, consisting of fourteen to eighteen gunboats and despatch vessels. Great stores of provisions for the use of the Sebastopol garrison had been collected at various points along the shores of this inland sea, and Osborn proceeded to destroy them with extraordinary dash and celerity, combined with cool judgment. He destroyed the Russian squadron at Berdiansk, and the military position at Taganrog, burning the Russian transport flotilla. He then bombarded Arabat, and cut off the supplies of the enemy by the capture of the store depôts at Genichi and Gheisk. At the latter place corn and hay were stacked for full 4 miles along the coast, protected by a large force of infantry and cavalry. Osborn anchored his gunboats close in shore, landed his seamen and marines in four divisions at intervals of a mile, and advanced them simultaneously on the enemy's defences, which were carried, and the whole of the vast magazines were utterly destroyed. In 1856 Osborn was promoted to the rank of post captain, and, at the request of Sir Edmund Lyons, he was appointed to the 'Medusa,' and retained his command of the squadron in the sea of Azov until the end of the war. The prostration of the Russian armies in the Crimea, which led to peace, was due in no small degree to the destruction by Sherard Osborn of all their resources of supply in the sea of Azov. For this distinguished service he was created a Companion of the Order of the Bath on February 5th, 1856, as well as an Officer of the Legion of Honour, and of the Medjidie. He was also specially presented to the Queen at Windsor; and so deeply was Lord Lyons impressed with the high qualities of Captain Osborn, that he expressed his opinion that "this young officer was fully capable of commanding a fleet."

Sherard Osborn became a Fellow of the Royal Geographical Society in 1856, and in the following year his first paper *On the Geography of the Sea of Azov, the Putrid Sea and adjacent coasts, with remarks on their commercial future* appeared in the Society's Journal.

In the spring of 1857 Captain Osborn was appointed to H.M.S. 'Furious,' on the news of a war with China, and he received orders to escort a force of fifteen gunboats to Hong Kong. His instructions gave him large discretionary powers as to the route and arrangements, and many essential preparations had to be made at Devonport under his superintendence. Doubts were entertained of these vessels, some of them of the lightest draught that had ever passed the Cape, effecting the voyage at all during the winter of southern latitudes. The Commander-in-Chief at Devonport, Sir William Parker, was so much struck with the

arduous nature of the task before Captain Osborn that, in giving him his parting orders, he said, in the presence of his secretary Mr. Charles Richards, "If ever you sir, deliver all that squadron safe to your admiral in China, you deserve to be made a commodore." He carried the squadron on a great circle to the south of the Cape, and the passage was made without one disaster. That squadron of gunboats changed the character of the war with China, and brought it to a successful issue. The 'Furious' took a prominent share in all the actions from the escalade of Canton to the capture of the Taku forts in 1858, and Osborn was the first to reach the city of Tientsin and the entrance of the Great Canal.

In the month of July 1858, the 'Furious' brought the intelligence of a treaty of peace to Shanghai, and two high Chinese officials were to follow to arrange the terms of the transit duties and to revise the tariff. But as they could not arrive for some weeks, a good opportunity offered for the British Ambassador to proceed to Japan, and there secure the same privileges that the Americans and Russians had recently exacted. Lord Elgin, with his private secretary Mr. Laurence Oliphant, embarked on board the 'Furious,' and was accompanied by the 'Retribution,' the gunboat 'Lee,' and the yacht 'Emperor.' After touching at Nangasaki, the 'Furious' weighed from Simoda on the 12th of August and, steaming up the gulf of Yedo, passed Kanagawa, and bore away for the capital of Japan. She went off the American chart on to really unknown waters, and was the first foreign man-of-war to anchor off the city of Yedo. An English squadron and an English Ambassador were now off the capital of Japan, the bearers of a message of good will, but yet to show, in a way not to be mistaken, that the hour had arrived for Japan to yield to reason. Lord Elgin successfully negotiated and signed a treaty, and on the 27th of August the 'Furious' weighed and proceeded to sea. The Ambassador, in his despatch, said—"I ascribe the success of the policy which I considered it my duty to carry out at Tientsin and Yedo, in a great measure to the zeal, energy, and devotion with which I was supported by Captain Osborn, and those under his command."

On the return of the 'Furious' to Shanghai, a question arose, in framing the supplementary treaty with China, as to how far it was possible to declare the great river Yang-tsze navigable to Europeans. Captain Osborn, judging from its volume at Nanking, felt confident that it must be navigable for hundreds of miles, and undertook to test the question. He conducted the 'Furious,' 'Cruiser,' and two gunboats up a falling and intricate river to Hankow, a distance of 600 miles from the sea; the 'Furious' having several times to be cleared to her keel to float her off unknown shoals and reefs. No ship of the size or draught of the 'Furious' has since been able to reach Hankow, and Captain Osborn's remarkable feat of seamanship enabled Lord Elgin to insist on the river being opened to foreign commerce. In his despatch, dated January 5th, 1859, the Ambassador said:—"The transport of a vessel the size of the 'Furious' to a point so remote from the sea under circumstances so peculiar is, I apprehend, a feat unparalleled in naval history. I consider the successful issue of this undertaking to have been mainly due to the energy, professional skill, courage, and judgment of Captain Osborn and his

able master." The latter officer was Mr. Stephen Court, formerly master with Sir Robert M'Clure in the Arctic Regions, and of whom Osborn speaks so highly in his narrative of the voyage of the 'Investigator.' Mr. Court died, from the effects of the climate during this severe service, on the 11th of April 1861. Captain Osborn was also obliged to be invalided, and he returned to England on half-pay in 1859, to undergo a long series of surgical operations.

Sherard Osborn had suffered serious pecuniary losses, and while on half-pay he devoted himself to literary labours for the support of his family; working late and early, in spite of depressing illness, and resolutely putting the whole power of his mind into the new and unaccustomed life to which duty pointed. Between December 1858 and May 1859, *A Cruise in Japanese Waters* was published in five numbers in *Blackwood's Magazine*, and afterwards as a separate volume. In the same periodical a paper *On Allied Operations in China* appeared in November, and *The Fight on the Peiho* in December 1859. In the latter paper he celebrated, not his own deeds, but those of his brother officers after he had been obliged to leave the scene—of Admiral Hope, of Willes and Shadwell, and of his dear old friend of the 'Collingwood' days—Jones Birom, to whom he was so warmly attached. It is characteristic of Osborn that when he laid aside the sword to take up the pen, it was not his own deeds of prowess that he recorded but those of his comrades; of M'Clure in the Arctic Regions, of Sir James Hope and his squadron in China. His papers on *Progress in China* appeared in May 1860, January 1863, and February 1863. In April 1860 was published his paper entitled *Our Position with China*, and in June 1861 *A Cruise on the Yang-tse in 1858-59*. His article on *The Voyage of the Fox in the Arctic Seas* was published in *Blackwood* in January 1860, *The Transatlantic Telegraph Iceland Route* in February 1861, and *The Physical Geography of the Sea* in March 1861. The two articles on *Iron-Clad Ships of War* appeared in November and December 1860.

In December 1869 Sherard Osborn published *The Career, Last Voyage, and Fate of Sir John Franklin*, a noble subject, ably and worthily treated. It is a charming memoir, written by one who had a heartfelt sympathy for the gallant Franklin and his brave companions, and one feels that every sentence comes direct from the writer's heart. It thus concludes—"As those men fell in their last sad struggle to reach home, their prayer must have been that their countrymen might learn how nobly they accomplished the task they had voluntarily undertaken. That prayer has been granted. As long as Britain exists, or our language is spoken, so long will be remembered and related the heroic fate of the crews of the 'Erebus' and 'Terror,' and how they died in the execution of their duty to their Queen and country."

Two papers were communicated by Osborn to the Geographical Society at this time; namely *Remarks upon the amount of Light experienced in High Northern latitudes during the absence of the Sun in 1858*; and *Notes Geographical and Commercial made during the Passage of H.M.S. 'Furious,' in 1858, from Shanghai to the Gulf of Pecheli and back in 1859*.

In the spring of 1861 Captain Osborn was appointed to the command of H.M.S. 'Donegal' a line-of-battle-ship, and in her he embarked a portion of the British

force sent to co-operate in the allied attack on Vera Cruz. Jones Birom, his shipmate in the 'Collingwood' as a midshipman, and whose gallantry at the Peiho, when his gunboat was sunk under him, was recorded in Osborn's article in *Blackwood*, was Commander of the 'Donegal.' After a service of some months on the coast of Mexico the 'Donegal' was paid off in 1862. This ship was in such admirable order that, on Osborn's recommendation, her first lieutenant received his promotion. During his absence, in the 'Donegal,' Osborn lost his father, Colonel Osborn, who died, at the age of seventy-six, on the 14th of September 1861.

In 1862 an offer was made to Captain Osborn, which he accepted, by Mr. Lay, as Agent to the Chinese Government, of the command of a large squadron of vessels to be equipped by him in England for the suppression of piracy on the coast of China. The offer was, however, accepted on the distinct understanding that Captain Osborn was not to be placed under any local authorities, in order to guarantee that the force should not be used against European powers, or in any way hostile to our naval sense of humanity and justice. Orders were to be received direct from the Emperor of China. With this understanding Captain Osborn accepted the command with the consent of the Admiralty, and officers were lent from the navy. A squadron of six vessels was constructed, equipped, and carried to the neighbourhood of Peking by Captain Osborn in 1863; under whom were Commander C. S. Forbes, R.N.; Commander Burgoyne, R.N.; Captain Allen Young, the companion of M'Clintock in the 'Fox'; while Spencer Chapman, who was a midshipman in the 'Furious' and was warmly attached to his beloved old captain, was Osborn's aide-de-camp.

The Chinese Government, however, repudiated the promises and engagements of Mr. Lay, and wished to place a mandarin as a superior officer on board Osborn's own ship. This of course altered the whole aspect of the affair. With the approval of his Government, Osborn had accepted the command, with the object of uprooting piracy. It now appeared that, if the Chinese view was accepted, the force would probably cause embarrassment to Her Majesty's Government, and be prejudicial to British interests. Osborn did not hesitate as to the course he should pursue under these circumstances. His ruling passion through life was devotion to his profession, and love of his country. He could easily have amassed a large fortune in a perfectly legitimate way; but the interests of England were his first concern, and he withdrew the whole force from China. His disinterested conduct received the highest commendation from his Government, and he also had the gratification of being privately very warmly and cordially thanked by Lord Palmerston.

We insert, in this place, a note by Sir Bartle Frere on his friend Sherard Osborn, with reference to his conduct in the disposal of the Chinese fleet.

"I first met Sherard Osborn in Bombay on his return from China, after breaking off his engagement with the Chinese Government, made through Mr. Lay. His conduct on this occasion was nobly disinterested and every way worthy of him. He had undertaken at the request of our Envoy to aid the Chinese Government in creating a navy to put down piracy on their coasts. He had formed in England the nucleus of such a navy

in the shape of a squadron of swift, well-armed, small vessels, and had taken them to China, when he found that the Chinese Government was determined not to adhere to their engagement with him, a cardinal point in which was direct communication with the Emperor and his Prime Minister. He found the Chinese, having got him and his vessels out there, were determined to place over him a mandarin, to whom he was to be completely subordinate. Osborn knew that this would make him a mere puppet in the hands of a Chinese, certainly quite ignorant of naval affairs and probably corrupt, and totally indifferent to the success of the plans devised by Osborn. After fruitless remonstrance, he threw up his engagement, though great sums were offered him to remain, and play into the hands of the mandarin clique, which hoped to make a good thing out of the naval expenditure.

"The question then arose what to do with the vessels? They had not been paid for nor delivered over to the Chinese, and were still in Osborn's possession. The war between the Northern and Southern American States had just broken out, and agents from the Southern States were then in China to purchase vessels to be fitted out as Southern cruisers to prey on the Northern trade. The agents had heard of Osborn's squadron, and would have paid a sum far above its cost to secure such formidable vessels—one of them was reputed to be not only one of the swiftest steamers then afloat, but, being armed with a Whitworth steel gun, one of the most formidable. Her combination of speed and handiness with an armament available at longer distances than most of the guns we then possessed, rendered her more than a match for vessels of much greater size and heavier metal, and there could be no doubt that in the hands of the Confederates she would have done more damage to the Northern trade than half a dozen Alabamas. Large sums were offered Osborn either to transfer the squadron himself or to wink at its transfer by the Chinese. It was intimated to him that he might name almost any terms and be sure that they would be accepted. The temptation was a great one to a very poor man, saddled with the cost of the whole squadron, and quite uncertain whether he could get rid of his responsibilities without utter ruin. But he was proof against the temptation, though put to him in a form which to a man of less sensitive honour might have seemed free from objection, and he sailed with his squadron, and with the heavy responsibility of its cost on his shoulders, to India, hoping there to find the Viceroy, Lord Elgin, who had been our British Ambassador in China, with whose approval he had undertaken the attempt to form a Chinese Navy. At Singapore he learnt of Lord Elgin's sudden death in the Punjab, and he therefore came on to Bombay where I was then Governor, and his old friend Admiral Montresor in naval command. At Bombay the offers of the American belligerents were repeated with such persistence that Osborn felt it would be unsafe to follow out his plan, which was to leave the vessels at Bombay and go to England himself to arrange for their disposal. The risk of the sale of the vessels to private parties leading to a serious breach of neutrality was made so clear to us, that we strongly recommended to the Government of India the purchase of the squadron, and Osborn thus by his foresight and noble disinterestedness prevented a second

and much more serious edition of the Alabama claims."

Sherard Osborn returned to England in April, 1864; and was appointed to the command of H.M.S. 'Royal Sovereign,' an old line-of-battle ship, which had been cut down and adapted to test the new system of turrets invented by Captain Cowper Coles. This talented officer had first conceived the idea of a turret ship while serving in the sea of Azov, and in the subsequent development of his system he had always received warm sympathy and encouragement from Sherard Osborn. At length he secured a fair trial, and Osborn had the pleasure of being able to report on the perfect success with which 12-ton guns were for the first time used at sea in the navy, and of otherwise showing the excellence of his friend's turret system. He remained in command of the 'Royal Sovereign' until the end of 1864, when she was paid off. In 1867 he published two articles in *Blackwood's Magazine*, relating to this subject, namely, *Our Naval Defences*, in January, and *The Turret Ships of England and America*, in February.

Sherard Osborn, since his return in 1854, had always strongly felt the importance to the navy, and the advantages to science, of a renewal of Arctic exploration. He had studied the subject in all its bearings with the greatest care, and to vast practical experience acquired in the Arctic Regions, he added a complete knowledge of all that had been done and written both before and since the period of his own voyages. He knew that sledge-travelling was the true way to explore the unknown region round the North Pole, and that a route must, therefore, be selected which offered the means of travelling along a coast line running in a northerly direction, as well as a safe retreat. These essentials are only to be found by way of Smith Sound, and, in raising the question, this route was selected.

Sherard Osborn's memorable paper on the exploration of the North Polar Region was read at the meeting of the Royal Geographical Society on the 23rd of January 1865, Sir Roderick Murchison in the chair. Never was there so large and enthusiastic a gathering of Arctic officers and men of science. Among the former were General Sir Edward Sabine, Admiral Collinson, Captain Richards, Captain Inglefield, Captain R. V. Hamilton, Captain Aldrich, Captain W. W. May, Captain Allen Young, Mr. Clements Markham, Dr. Donnet, Dr. Domville, and Mr. Dean, the worthy and zealous carpenter in three Arctic expeditions. There were also the Comte de Paris, Lord Dufferin, Sir Henry Rawlinson, Sir John Lubbock, Mr. Spottiswoode, and Mr. John Barrow. The address was eloquent and conclusive, and stirred up the feelings of those who heard it to such purpose that the subject was not again allowed to drop. To those who alleged that Arctic labours and researches had merely added so many miles of unprofitable coast line to our charts, his answer was most telling. He said:—

"They should confront our knowledge of 1864 with that of 1800, upon the natural history, meteorology, climate, and winds of the Arctic Regions. They must remember that it was there we found the clue, still unravelled, of the laws of those mysterious currents which flow through the wastes of the ocean like two mighty rivers—the Gulf Stream and the Ice

Stream; they must remember that it was there—in Boothia—that the two Rosses first reached the Magnetic Pole, that mysterious point round which revolves the mariner's compass over one-half the northern hemisphere; and let the world say whether the mass of observations collected by our explorers on all sides of the Magnetic Pole have added nothing to the knowledge of the laws of magnetic declination and dip. They should remember how, a few years ago, it was gravely debated whether man could exist through the rigours and darkness of a Polar winter, and how we have only recently discovered that Providence has peopled that region to the extreme latitude yet reached, and that the animals upon which they subsist are there likewise, in winter as well as in summer. All this, and much more, should be borne in mind by those cynics who would have you believe we have toiled in vain; and I hold, with the late Admiral Beechey, 'that every voyage to the north has tended to remove that veil of obscurity which previously hung over the geography and all the phenomena of the Arctic Regions. Before those voyages all was darkness and terror, all beyond the North Cape a blank; but, since then, each successive voyage has swept away some gloomy superstition, has brought to light some new phenomenon, and tended to the advancement of human knowledge.'

He enumerated the objects to be attained, and explained that they should be secured by the despatch of two screw steamers by way of Smith Sound, under naval auspices. "It is," he said, "by the action of public opinion, directed by the men of science in this country, that I hope to see a Polar expedition sent forth in this generation under naval auspices. The navy needs some action to wake it up from the sloth of routine, and save it from the canker of prolonged peace. Arctic exploration is more wholesome for it, in a moral as well as a sanitary point of view, than any more Ashantee or Japanese wars."

"You are not going to educate us, work us up to the point of nautical perfection, awaken hopes and ambition, and then give us oakum to pick, or run us over the mast-head after top-gallant yards, to keep down the spirit which intellectual progress has evoked. The navy of England cries not for mere war to gratify its desire for honourable employment or fame. There are other achievements, it knows well, as glorious as victorious battles; and a wise ruler and a wise people will, I hold, be careful to satisfy a craving which is the life-blood of a profession—indeed, I hold that it ought to be fostered and encouraged. Upon these grounds, as well as those of scientific results, would it be too much to ask for a fraction of the vast sum yearly sunk in naval expenditure, for two screw-vessels and 120 officers and men, out of the 50,000 men annually placed at the disposal of the Admiralty?"

This was what Sherard Osborn asked for in 1865, and went on asking for, until he got it in 1875. In spite of lukewarmness, in spite of divided counsels, he went on steadily working, preparing the public mind by writing, and by encouraging others to speak and write, until at last he secured unanimity, and gained his great and patriotic aim.

Meanwhile he was busily employed in other important work. In 1865 Messrs. Blackwood brought out a uniform edition of Sherard Osborn's works in three volumes; the first containing *Stray Leaves from an*

Arctic Journal and The Career, Last Voyage, and Fate of Sir John Franklin; the second *The Discovery of a North-West Passage*; and the third *Quedah, A Cruise in Japanese Waters*, and *The Fight on the Peiho*. In the same year he was specially elected by the Committee a member of the Athenæum Club. He was also a member of the Junior United Service, Garrick, and Reform Clubs.

His distinguished position in the navy, and his well-known talent as an administrator, led to his being offered the post of Agent for the Great Indian Peninsular Railway Company, which he accepted, and he sailed for Bombay on March 3rd, 1865. He found a chaos. He worked hard, and in the space of a year he reduced the traffic, and all the other departments to order. His talent for organization was most valuable, and was especially useful in arranging for the cotton traffic, and for the storing and shipment of the bales. When he returned to England in April 1866, he received the special thanks both of the Government of Bombay and of the Supreme Government of India, who expressed "very sincere regret at the prospect of the loss of Captain Sherard Osborn's services, which Government believes to have been most valuable to Government and the public."

Sir Bartle Frere thus writes of Osborn's services at Bombay:—

"I next knew him when he came out as manager of the G. I. P. Railway in March, 1865. It is one of the longest and most important in India, and owing to the death of an able chief engineer, whilst it was still incomplete, and other causes, had got into an unsatisfactory state. Osborn came out with extraordinary powers, which he exercised with his usual prompt decision, the result of full knowledge of the affairs with which he dealt, and at the same time with a kindly consideration which took off the sting from the many unpleasant duties which fall on the reformer of such an undertaking when once its affairs have got into disorder. His presence acted like magic: difficulties of every kind disappeared; an incredible amount of work was got through in a marvellously short space of time with an amount of friction far less than had ever been experienced; every one was soon convinced that such management by such a man was of all forms of administration the best for such undertakings in India. But when the difficulties had disappeared, he felt that there was, in some influential quarters, an inclination to limit the discretion which had achieved so much, and, convinced that any such limitation would destroy his power of useful action, he, with his usual independence, resigned his lucrative and honourable post, rather than hold it on terms inconsistent with efficiency.

"I met at this time with an instance of the simple kind-heartedness which was so conspicuous in all he did. I was congratulating a friend who had been a fellow passenger of his, in the homeward-bound steamer, on having so agreeable a companion, when my friend remarked—'But we hardly ever saw him the whole voyage. There was a friend invalided home, and supposed to be dying, and Osborn sat with him day and night, nursing him as if he—Osborn—had been his friend's mother, and till the sick man was able to walk about no one ever saw Osborn.'

"It has always been a great satisfaction to me to

know that when he thought he would be compelled to retire from the navy I spoke to him very seriously to the effect that his quitting the service would be a national loss. I spoke only what I felt, and have never thought I over-estimated the loss the navy would have sustained had he been then withdrawn from it, for I looked to him ever since I first knew him as a man destined to be one of our great naval captains if he ever lived to see another war."

In 1867 Sherard Osborn undertook the office of Managing Director of the Telegraph Construction and Maintenance Company for the purpose of giving his professional knowledge to the work of establishing submarine telegraph communication between Great Britain and her Indian and Australian possessions and colonies. He felt that in furthering these enterprises he was doing good service both to the navy, and to commerce. In four years the great work was completed by a series of submarine cables from Falmouth, the Mediterranean and Red Seas, to India, Hong Kong, and Australia, and, as his successor Admiral Richards truly said, "Captain Osborn might feel that, from a public as well as a professional point of view, he had served the commercial as well as the military interests of his country." On the 29th of November 1870 Osborn read a paper at a meeting of the Geographical Society on *The Geography of the bed of the Atlantic and Indian Oceans and Mediterranean Sea*, in which he announced that 17,000 miles of cable, worth £6,000,000, had been laid during the two previous years. He held the post of Managing Director of this Company from 1867 to 1873, when he was succeeded by his old friend and Arctic comrade, Admiral G. H. Richards.

In 1868 Sherard Osborn stood for Birkenhead, at the general election, fighting a gallant battle in the liberal interest against the overwhelming local influence of the Messrs. Laird. He was unsuccessful; and his defeat was a loss to the House of Commons and to the country. For Osborn had a most agreeable voice, ready fluency of diction, and the rare gift of eloquence; combined with great knowledge of naval matters and of railway and telegraph management, and remarkable administrative talent. He continued to take a keen interest in politics, and was frequently officially consulted on the various subjects respecting which he had special knowledge.

In June 1870 he was elected a Fellow of the Royal Society. In 1871 he commanded H.M.S. 'Hercules' in the Channel Squadron for a few months, and on the 29th of May 1873 he was promoted to the rank of Rear Admiral. His devotion to all matters relating to his profession never flagged. In 1873 he wrote and published a thoughtful and most valuable pamphlet on the coast defences of Great Britain; and at the very time of his death he was actively engaged upon the important question relating to breech and muzzle-loading guns.

In 1872 Sherard Osborn considered that the time had come for renewing the effort he had made in 1865, and, on the 22nd of April 1872, his second paper was read on the exploration of the North Polar Basin, at a very full meeting of the Geographical Society. He repeated his previous arguments, which had all been materially strengthened by the various attempts of Swedes, Germans, and Americans, in the interval. As in 1865, so in 1872, he maintained that

the route by Smith Sound is the one by which experience has given British navigators the best assurance of reaching a high latitude with the greatest certainty, and the smallest amount of risk to ship and life. This time perfect unanimity was secured among Arctic authorities, and a Committee was appointed by the Council of the Geographical Society to draw up a memorandum on the results to be obtained by Arctic exploration, consisting of Admiral Sir George Back, Admirals Collinson, Ommanney, Richards, and Sir Leopold M'Clintock, Captain Sherard Osborn, and Mr. Clements Markham. During the next two years and a half Sherard Osborn was actively engaged in the good cause, and it is due to his vigour, combined with wise and judicious management, that success was at length secured. In the number of *Ocean Highways* for July 1872, he wrote an article urging that "Arctic exploration is the right field in which to keep up the high repute and spirit of our navy, and that it is calculated to stimulate officers to that career of exertion, emulation, and self-sacrifice, which is really the soul of the service." And he raised a warning which appealed to the pride of his countrymen and had a lasting effect. Speaking of the attempts of foreigners he said—"If the 'rest and be thankful' policy is much longer adhered to, we cannot but feel that the explorers of one or other of these nations may wring from us the honour of exploring the polar area, around the threshold of which British seamen have, since the days of the memorable voyages of Cook and Phipps, just a century ago, toiled and suffered, and achieved successes until the honour lies just within our grasp."

On the 16th of December 1872, Sherard Osborn, accompanying Sir Henry Rawlinson and a numerous deputation, waited on Mr. Lowe and Mr. Goschen to urge the importance of despatching an Arctic Expedition. After reading a letter, and introducing the subject generally, Sir Henry referred to Captain Osborn for details, who explained that the expedition should consist of two well strengthened screw steamers, with crews of sixty men each, and be provisioned for three years. One vessel would press as far as possible to the northward up Smith Sound, while the other remained within reach of communication with Baffin's Bay; both being engaged in obtaining valuable scientific information within the unknown area. Mr. Lowe said that the subject was one of great interest, and that it should receive careful and mature consideration. But his reply, dated January 1st, 1873, was unsatisfactory.

The goal was, however, now in view. A few more well-conceived and vigorous efforts and success would be secured. Sherard Osborn found that the objection to which official and other persons most obstinately clung, was based on the alleged difficulties and dangers of ice navigation. He, therefore, came to the conclusion that nothing would more tend to dispel this objection than some practical proof or trial, and that it was essential that a naval officer should proceed to the Arctic Regions in a whaler, and return with a full report of all he had seen and experienced.

He selected for this important service, Commander A. H. Markham, who had been an ardent volunteer for the hoped-for Arctic Expedition when Osborn first raised the question in 1865, and when he was a young

lieutenant; and who had ever since taken a deep interest in the efforts for the renewal of Arctic exploration. Under Osborn's auspices Commander Markham embarked at Dundee in the whaler 'Arctic,' and accompanied her in her remarkable and very successful cruise. This voyage showed the great change that powerful screw steamers have made in ice navigation. The 'Arctic' was only detained sixty hours by the ice of Melville Bay, where former expeditions composed of sailing vessels had usually been stopped for several weeks. It is also remarkable that, in his short summer cruise, Commander Markham passed the farthest points reached by Sir Edward Parry's expedition in 1824; by Sir James Ross's in 1848; by Mr. Saunder's in 1850; by Captain Forsyth's in 1850; by Mr. Kennedy's in 1851; and within a few miles of Sir Leopold M'Clintock's in 1858. Commander Markham returned in August 1873, and published the results of his observations and of the experience he had acquired in ice navigation, in a work entitled *A Whaling Cruise in Baffin's Bay*, to which Admiral Sherard Osborn wrote an introduction. In the meanwhile a second careful and elaborate memorandum had been prepared by the Arctic Committee of the Geographical Society on the scientific results of Arctic exploration. The latter half of this memorandum, in which it is explained, from the knowledge and experience already acquired, why such researches can only be successfully accomplished by a naval expedition despatched under Government auspices, and secured as far as possible from failure or disaster by careful organization and good discipline, was written by Sherard Osborn. At the meetings of the British Association at Brighton in 1872, and at Dublin in 1874, papers written by him, were read, advocating the despatch of an Arctic Expedition.

Strengthened by the results of Commander Markham's voyage, and by the arguments of the memorandum, the Presidents of the Royal and the Royal Geographical Societies, accompanied by Admiral Sherard Osborn, had a very satisfactory interview with Mr. Disraeli on the 1st of August 1874; and on the 17th of November the Prime Minister addressed a letter to Sir Henry Rawlinson announcing that Her Majesty's Government had determined to lose no time in organizing a suitable expedition to explore the region of the North Pole. Thus, after ten years of unceasing labour, involving much brain-work, and no small amount of tact and prudent management, the patriotic exertions of Sherard Osborn were crowned with complete success. Much is to be attributed to the gradual preparation of the public mind by the numerous publications on Arctic matters either written or inspired and encouraged by Osborn; something doubtless to the memorandum of scientific results. But Admiral Osborn always said, and no one had such good means of knowing, that the crowning arguments which turned the scale were derived from the voyage of Commander Markham to Baffin's Bay.

As soon as the expedition was decided upon, the Admiralty wisely appointed a committee, consisting of Admirals Richards, Sir L. M'Clintock, and Sherard Osborn, on the 24th of November 1874, to settle all the details regarding the description of ships to be employed, the various kinds of stores and provisions required, the preparation of boats and sledges, the

sanitary arrangements, and the instructions to be given. The Report of the Committee is dated February the 4th 1875, and was signed after its members had held nineteen meetings. These members were also members of the Arctic Committee of the Royal Geographical Society; and the main recommendations of the Report are identical with those contained in Osborn's paper of 1865. They are, that the ships to be employed should be two screw steam vessels, strengthened and fitted for Arctic service, and capable of carrying stores and provisions for at least three years, and a complement of about sixty men for each ship; a third ship being sent out in the spring of 1877 for relief, if the expedition has not then returned. The reasons why the Smith Sound route is preferable to any other are then stated to be, first, that its entrance has been found free of ice by several vessels, and that one expedition reached as far as the 82nd parallel; second, that it is known to have a continuous coast-line up to 82° N., where dépôts could be placed, and that the Danish settlements can be fallen back upon from it in case of disaster; third, it is the only route promising a continuous coast-line far north, on which the prospect of reaching the Pole by travelling parties mainly depends; and fourth, animal life is abundant up Smith Sound. The Committee then recommend that the expedition should sail in about the middle of June or earlier; that it should touch at Disco and at Proven and Upernivik for dogs; that Lyttleton Island near the entrance of Smith Sound should be fixed upon as a rendezvous, where records should be left; and that the ships should then proceed up Smith Sound, erecting cairns and leaving records on conspicuous points, not more than 60 miles apart. Capes Frazer, Back, and Beechey on the western, and Capes Jackson and Bryan on the eastern shore are named. It is recommended that, while both ships should share in the objects of discovery and exploration, one should be so placed that she would serve for the crew of the other to fall back upon, and that the united crews, if their ships are still detained by the ice, could retreat to the relief ship at the entrance of Smith Sound in 1877. Consequently, the second ship must not go northward of the 82nd parallel. It is suggested that as soon as the winter quarters of the second ship are selected, the leader of the expedition might take a portion of her crew to enable him to accomplish a sledging attempt to reach the Pole. It is not contemplated that the two ships should winter at a greater distance apart than 200 miles; and they are to be abandoned if their extrication is doubtful during the navigable season of 1877. All points connected with provisions and clothing were considered by the Committee, with the aid of Dr. Lyall and Mr. James Lewis, Paymaster, R.N., both officers of Arctic experience; and the sledge equipments were left to Sir Leopold M'Clintock, as well as the sanitary arrangements on board the ships. But the Committee urge that all possible measures should be taken to secure warmth, ventilation, and the absence of condensed vapour between decks. One great advantage enjoyed by the Arctic Expedition has been that Sir Leopold M'Clintock was Admiral Superintendent of Portsmouth dockyard at the time of fitting out, and that thus all the gear was fitted and arrangements made by the highest living authority on sledge-travelling.

The ships were commissioned on the 15th of April 1875, and the following is a list of the officers.

H.M.S. 'ALERT.'

(751 tons, 100-horse power).

Captain . . .	George Strong Nares, F.R.S., F.R.G.S.
Commander . . .	Albert Hastings Markham, F.R.G.S.
Lieutenant . . .	Pelham Aldrich.
" . . .	Alfred A. Chase Parr.
" . . .	George A. Giffard.
" . . .	William H. May (<i>navigating duties</i>).
Sub-Lieutenant . . .	George Le Clerc Egerton.
Fleet Surgeon . . .	Thomas Colan, M.D.
Surgeon . . .	Edward L. Moss, M.D.
Assistant-Paymaster . . .	Edgar De H. Whiddon.
Engineer . . .	James Wootton.
" . . .	George White.
Naturalist . . .	Captain Feilden, R.A.

H.M.S. 'DISCOVERY.'

(556 tons, 96-horse power).

Captain . . .	Henry F. Stephenson.
Lieutenant . . .	Lewis A. Beaumont (<i>navigating duties</i>).
" . . .	Robert H. Archer.
" . . .	Wyatt Rawson, F.R.G.S.
" . . .	Reginald B. Fulford.
Sub-Lieutenant . . .	Crawford J. M. Conybeare.
Surgeon . . .	Belgrave Ninnis, M.D.
" . . .	Richard W. Coppinger, M.D.
Assistant-Paymaster . . .	Thomas Mitchell.
Engineer . . .	Daniel Cartmel.
" . . .	Matthew R. Miller.
Naturalist . . .	Chichester Hart.

Osborn had been visited by much home affliction while the Arctic Committee was sitting. His brother, Captain Noel Osborn, R.N., a good officer, who served in the 'North Star' in the Arctic Regions, died suddenly on January 23rd, 1875, and almost at the same time he lost one of his brothers-in-law. He had also been overtasked by brain-work of various kinds. Still the fitting out of the Arctic Expedition was an object of deep interest to him, such as had the power to divert his thoughts from painful subjects. In it he lived his old enthusiastic life again. It was, in very fact, his creation: and he took the most affectionate interest in the young aspirants to Arctic fame. On Monday, the 3rd of May, he came down to Portsmouth, and was constantly on board the ships on that and the two following days, examining into all the details, making the acquaintance of those officers whom he had not known before, and doing many acts of thoughtful kindness.

On the evenings of Monday and Tuesday, he received several of the officers at dinner at his hotel, told them his experiences and many pleasant stories of Arctic life, and renewed the memory of past days, while encouraging them with hopes of future success. His bright and cheery smile, and friendly words will long be remembered by his young successors in Arctic work. It was a happy time for him—those three days—and, in our grief and regret at what was so fearfully close at hand, it is a consolation to think of them. He returned to London on Wednesday. On Thursday, the 6th day of May, he was well and busily employed at the Admiralty, at the Athenæum, and in Savile Row during the day. He went out to dinner, was taken ill at half-past eight with heart disease, became insensible after three quarters of an hour, and died at about ten.

Sherard Osborn was buried at Highgate Cemetery, on Monday, the 10th of May 1875. Many true

mourners stood round the grave; with the widow, the two daughters, and the sister of the brave and noble dead. Of his Arctic comrades there were Richards and M'Clintock, Allen and Lyall, Pickthorn who was with him in the 'Pioneer' in 1850-51; and Clements Markham who also served with him during four years in the 'Collingwood.' There, too, were John Barrow, the staunch old friend of all Arctic officers, Allen Young, and Leigh Smith. The present Arctic Expedition was represented by Captains Nares and Stephenson, Commander A. H. Markham, Lieutenants Parr, Rawson, and Giffard, and Sub-Lieutenant Egerton. Captain C. S. Forbes, Spencer Chapman, and Colonel Jenkyn Jones, the brother of his old friend Jones Birom, were there; and among other old naval friends there were Admiral Sir John Hay, Admiral Rowley Lambert, Captains Seymour, Mayne, Davidson, and Mr. Charles Richards. Sir Henry Rawlinson was there to do honour to Osborn's memory, both as a friend and as President of the Geographical Society; and many others, among them Mr. Lack, the outfitter in the Strand, who has fitted out two generations of Arctic officers. The Hon. Frederick Walpole, M.P., an old 'Collingwood' messmate, was unable to be present, but sent his carriage.

That Sherard Osborn's death was a national loss has been declared by the unanimous voice of public opinion. The *Times* thus wrote of him:—"He had lived long enough to do the State distinguished service, and seemed to be a man to whom in an emergency we should turn for aid of even greater value in the days to come. He was made of too stern materials to be a universal favourite. His opinions were too uncompromising, and his will too determined to be fully appreciated in a time of peace. But, during an active and varied career, he had won the respect of his profession, and few men had warmer and more devoted friends among those—and they were many—who knew him well, whether civilians, brother officers, or shipmates in the humbler walks of life. He was gifted with the highest professional abilities, pre-eminent for cool self-possession and ready resource in action, daring to the utmost stretch of naval audacity, but as prudent as he was daring, a strict disciplinarian, yet one of the most popular of captains." The *Spectator* spoke of him as "one of the best specimens of a very fine class, the educated naval officer who knows his profession thoroughly, but knows business too, and understands politics on the great scale. He had displayed qualities which pointed him out as a reserve force, a man who might head the fighting fleet in a great war, or even administer the entire navy." His death was, indeed a national loss, but we mourn him as a dear friend, as one whose like can never more be found. Few know of the thousand acts of generous and unselfish kindness which constitute one bright side of his life story, but each out of hundreds knows of one or more such acts. All who really knew him will ever remember his bright and cheerful face, his hearty greeting, his pleasant genial voice. That his life will long serve as an example to others we may feel well assured; for there never lived a better sailor, a braver officer, a truer man, a more faithful and affectionate friend than Sherard Osborn.

THE ARCTIC EXPEDITION.

THE loss of its truest and wisest friend is a calamity to the Arctic Expedition. Sherard Osborn, if he had been spared, would have devoted all the energies of his mind to furthering the interests of the absent explorers. His great influence, his tact and prudence, his powers of persuasion and, when necessary, of denunciation, and his intimate knowledge and appreciation of the work, would have constituted him a friend of inestimable value. It is a calamity, but it is not one that should cast any gloom over the departure of the Arctic ships. Osborn had lived long enough to secure the despatch of the expedition, to take part in all the preparations, and to wish God speed to his gallant young successors in Arctic exploits. The explorers will think of him as of one who has completed his work nobly and manfully, and, in seeking to emulate his deeds, his memory will be a source, not altogether of regret, but also of pleasure and admiration.

On that 5th of May when he saw them last, Osborn left the ships in the steam basin of Portsmouth dockyard, fully rigged, and with the stowage of the coals and of three years' stores and provisions nearly completed. Since then the work has been steadily continued.

The ships are barque-rigged like the whalers, and fitted with Pinkey and Collins' patent reefing and furling topsails, an arrangement which obviates the necessity of men going aloft for either purpose; and they have a large amount of fore-and-aft canvas. The crow's-nests are lashed to the main royal poles. They are of wood, and about 5 feet high by $2\frac{1}{2}$ in diameter, entered by a trap in the floor, and with a hood of canvas working on a hoop round the upper rim, Jacob's ladders beginning from the lower rigging lead to the trap-hatch. The screw propellers are raised by means of a tackle and small pair of iron shears; the hook being attached by a hole in the upper part of one of the fans, and no framework being used. Two spare fans are kept in readiness on the upper deck. The rudder, although three tons weight, is easily unshipped and triced up to two davits over the stern; and a spare rudder is supplied to each ship. Both ships have been considerably strengthened. Outside there is a doubling of $4\frac{1}{2}$ inches of teak from the water-ways to the keel. Inside, the bows have been fortified by numerous strong diagonal and fore-and-aft carlings, and the beam power has been considerably augmented. Iron knees have also been added; and a fore-and-aft stringer of eight inches thickness, between the shelf-piece and water-ways, right round the ship on the lower deck, has been introduced, which securely fastens and ties the timbers and plankings together. On the bows there are iron plates of half inch thickness, and eight to ten feet in length, which are bolted to the stern, and will protect the bows, and assist in charging and crushing the ice. Filling-in pieces have been put under the channels of the 'Alert' to allow the ice a free passage. The 'Discovery' has no channels. The figure-heads consist of a Union Jack painted on a shield, and surrounded by gilded scroll work, with the motto *Ubique*, and on the bowsprit head of the 'Alert' is a horse-shoe, which has already brought luck to many ships on many seas. Each ship has a white

streak just above the water-line. The 'Alert' has a red, and the 'Discovery' a green line, a few inches below the gunwale. The boats are white, with red and green lines respectively; and the crow's-nests are also white, with red hoops round that of the 'Alert,' and green round that of the 'Discovery.'

Each ship has nine boats, all built by White, of Cowes. These are a 25-foot yawl, pulled by 10 oars, a 20-foot cutter, two whale boats completely equipped with lines and harpoon guns, one whale boat for the captain's use, two 20-foot ice-boats, one 15-foot ice-boat, and a 12-foot punt. The boats are propelled by oars or paddles, and are built as light as possible. Each boat has a strip of copper on either side of her entrance to protect her bows when coming into contact with the ice. All are diagonally built. Six are hoisted up to davits, three on each side; and the yawl and two ice-boats are stowed on skids over the quarter-deck while at sea. Four ice-saws and tripods are supplied to each ship, besides ice-anchors, chisels, claws, and other Arctic implements.

The 'Alert' stows 175 tons of fuel; 90 tons of which (patent fuel) are for steaming, and the remainder (hand picked North Country, and a little anthracite,) are for cooking and warming purposes. The consumption of coal is about four tons for twenty-four hours for a speed of six knots. The warming is effected by nine stoves, besides the galley fire. Each ship has on board thirty-nine months' provisions for sixty men.

The complement of each ship, besides officers, consists of a chief boatswain's and a chief carpenter's mate, a ship's steward, a ship's cook, two captains of the fore-castle, three ice quartermasters from Dundee and Peterhead, a captain of the fore and a captain of the main top, a sail-maker, a rope-maker, an armourer, a cooper, a caulker, a carpenter, a second captain of the fore and main tops, fourteen able seamen, on board the 'Alert,' and twelve on board the 'Discovery,' a captain's and a ward-room steward, a ward-room cook, four stokers, a sergeant and six marines, and two dog-drivers. The whole complement of the 'Alert' is sixty-two, and of the 'Discovery' fifty-eight officers and men. The 'Alert' has already shipped one dog-driver, Mr. Patersen. She will take on board one, and the 'Discovery' two in Greenland; with thirty dogs for each ship. In the 'Alert' will also be Commander Markham's noble black retriever *Nelly*, which was reared and trained on board H.M.S. 'Sultan,' and is now about four years old, and in the prime of life; and a white cat presented by the boatswain of Portsmouth Dockyard.

Much attention has been given to preparations for securing scientific results. Captain Nares is a practised surveyor, and also brings from his experience in the 'Challenger' a knowledge of dredging and deep-sea sounding. Commander Markham has studied and practised surveying, and has also gone through courses of instruction in magnetism and spectrum analysis. Lieutenants Parr and May will use the transit instrument, and have gone through a course of instruction with the spectroscope, and Lieutenant May will do the navigating work. Lieutenant Giffard has studied terrestrial magnetism. Dr. Colan will test for the presence of ozone and take other observations, and Dr. Moss is a microscopist and an excellent artist. Mr. White is a photographer. These officers form

the scientific staff of the 'Alert.' They will all collect zoological and botanical specimens as opportunities offer; in which they will receive able co-operation from Captain Feilden, R.A., who has been appointed as naturalist. In the 'Discovery' Lieutenant Beaumont will be the navigator, and Lieutenants Beaumont and Rawson will undertake the pendulum observations. Lieutenants Archer and Fulford have gone through a course of instruction in magnetism, and Sub-Lieutenant Conybeare will observe with the spectroscope. Dr. Coppinger is a photographer. These officers form the scientific staff of the 'Discovery.' Of course, as in the 'Alert,' all the officers will lose no opportunity of collecting zoological and botanical specimens. Mr. Chichester Hart, has also been appointed to the 'Discovery,' as naturalist; his qualifications being chiefly those of a botanist.

The great scientific want of the expedition is a trained field geologist who has given special attention to glacial action and to other Arctic geological problems. Commander Markham, and some of the other officers, have studied geology, but it is a science which cannot be efficiently learnt without field work and a long training, and, although pains will be taken to observe accurately and to record carefully, yet the absence of a trained geologist of mark is a serious defect in the staff of the expedition.

A series of instructions, or rather of suggestions, has been prepared by the Royal Society for the use of the Arctic officers: on meteorology by Mr. Scott; on the spectrum of the sun with a view to terrestrial absorption, by Professor Stokes; on the eclipse of March 25th, 1876, by Mr. Hind; on pendulum observations, by Professor Stokes; on the polarisation of light, by Mr. Spottiswoode; on tides, by the Rev. Samuel Haughton, D.D.; on botany, by Dr. Hooker; on the collection of hydroids and polyzoa, by Dr. Allman; on terrestrial magnetism, by Professor Adam; general hints, by Professor Huxley and Mr. Tyndall; on the detection of meteoric cosmical dust in the snow, by Professor Roscoe; on the phenomena of the Aurora, by Mr. Rand Capron; on collecting mammalia, by Dr. Gunther; on cetacea, by Professor Flower; and on the towing-net, by Dr. Allman. Papers from transactions of Societies, and extracts from books on Arctic zoology, botany, geology, and physics, with other matter, have also been reprinted and edited by Professor Rupert Jones, as an Arctic Manual. The portion on Arctic birds is by Professor Newton of Cambridge.

The Royal Geographical Society has presented to the expedition a volume of "Selections of Papers on Arctic Geography and Ethnology." The first part contains: papers by Dr. Robert Brown, on the geography of Greenland, with an account of its inland ice, and the formation of fiords and icebergs, and a narrative of all attempts to penetrate into the interior; a paper proposing to attempt to reach the pole by the Smith Sound route, by Baron von Wrangell; a criticism on Dr. Kane's discoveries by Dr. Rink; a paper on the Arctic current by Admiral Irminger; and a most valuable series by Admiral Collinson on the ice along the coast of Arctic America, with a sketch of the work of all the expeditions that have made discoveries in that part of the frigid zone. The second portion contains papers on the origin and migrations of the Greenland Eskimo, and on the Arctic Highlanders; a sketch of the Eskimo grammar

and classified vocabularies; and a list of all names of places on the coast of Greenland, with Eskimo names and their meanings, ancient Norman sites, Danish names, and names and latitudes on the Admiralty chart, with remarks, by Mr. Clements Markham; a note on the origin of the Eskimo by Dr. Rink; a detailed memoir on the Western Eskimo by the late Dr. Simpson; and a Report by a Committee of the Council of the Anthropological Institute with a series of suggestive questions.

Due attention has been given to the provision of amusements and instruction during the winter quarters, the trying period of forced inaction. Sub-Lieutenant Egerton and Lieutenant Rawson have undertaken the preparations for dramatic entertainments, concerts, masqued and fancy dress balls, foot-ball matches, and other in-door and out-door diversions; and many presents of books and games have been received. Sub-Lieutenants Egerton and Conybeare, under Commander Markham and Lieutenant Beaumont, have done most of the hard work connected with the close personal superintendence of the stowing of the holds; while the other officers have been busily engaged in receiving scientific instruction. But all is now nearly ready; and by the 29th of May as fine and gallant a crew of officers and men as ever left these shores will be ready to sail for the Arctic Regions, and to resume the glorious work of exploration within the frigid zone.

In a previous article* we gave our readers a detailed account of the work of an Arctic Expedition, including the sledge-travelling. There are nineteen sledges supplied to each ship; with tents, sleeping-bags, and cooking apparatus for two twelve-men sledges, six eight-men, and six five-men sledges which can be used as dog sledges; two heavy sledges for work near the ship, a light cart for travelling over the land, a long ladder sledge designed for glacier travelling, and two small satellite sledges. The officer of each sledge will have a flag and a motto, and will christen his sledge by some name. The flag of Captain Nares has been beautifully worked and embroidered by Lady M'Clintock. It is a silken Union Jack, embroidered on one side with the Nares crest, two spears crossed saltire-wise with a knot *azure*, and the motto *Dum spiro spero*, and on the other side a rose, thistle, and shamrock.

The other flags are in accordance with the heraldic rules which prevailed in the days of chivalry, when each officer had his standard, 3½ feet long, swallow tailed, with a cross of St. George *gules* on a field *argent* next the staff, the rest parted per fess with the colours of the arms and charged with the crest, a narrow bordure gobbony of twisted silken cord also of the colours of the arms.

The sledge flag of Commander Markham was worked and embroidered by Mrs. Clements Markham. Next the staff a cross of St. George *gules* embroidered on white silk; the rest per fess *or* and *azure*, swallow tailed, and charged with an embroidered winged lion of St. Mark passant, holding a pair of hames all *gules*; a bordure gobbony of twisted silk *or* and *azure*. The motto *Luctor et Emergo*. The flag staff, presented by Captain Hoskins, R.N., of H.M.S. 'Sultan,' is of lance-wood, surmounted by a truck consisting of a

* *Geographical Magazine* for March 1875, p. 65.

solid silver naval crown, above which is a silver star of five points and round the staff are silver bands with the Markham crest and monogram. His sledge will be christened the "Marco Polo." Commander Markham is of the family of Markhams of Cotham, in Nottinghamshire, a daughter of which married the father of Sir Hugh Willoughby, the famous Arctic navigator.

The sledge flag of Lieutenant Aldrich has the cross of St. George *gules* on a field *argent* next the staff, the rest, swallow-tailed, per fess *vert* and *or* charged with a bull *argent*, a bordure gobby of silken cord *vert* and *or*. The motto *Fortitudo vincet*. Lieutenant Aldrich is a nephew of Captain Aldrich, R.N., who distinguished himself as an Arctic sledge traveller in 1851.

The sledge flag of Lieutenant Parr is per fess *azure* and *argent*, charged with a crowned female head; the rest as the other flags. The motto *Faire sans dire*.

The sledge flag of Lieutenant Giffard is barry of six *gules* and *argent* charged with a stag's head; the rest as the other flags. The motto *Spare not*.

The sledge flag of Lieutenant May is per fess *or* and *gules* charged with a leopard's head issuing from a ducal crown *or*; the rest as the other flags. The motto *Nil desperandum*, the same as was used by Sherard Osborn during the sledge travelling of 1851.

The sledge flag of Sub-Lieutenant Egerton is per fess *gules* and *argent* charged with three arrows crossed *sable*; the rest as the other flags. The motto *Virtuti non armis fido*. A daughter of the house of Egerton was the mother of Sir Hugh Willoughby, the brave old Arctic navigator.

In the 'Discovery' the sledge flag of Lieutenant Beaumont is *gules* charged with a cinquefoil ermine. The rest as the other flags. The motto *Erectus non elatus*.

Lieutenant Archer has *azure*, three arrows, *or*. The rest as the other flags. The motto *Bona acta que honesta*.

Lieutenant Rawson has per fess undy *sable* and *azure*, charged with a raven's head *sable* guttee *or*, with a gold ring in its beak on an escutcheon *argent*. The rest as the other flags. The motto *Laus virtutis actio*.

The sledge flag of Lieutenant Fulford is per fess *gules* and *argent*, charged with a bear's head *argent*. The rest as the other flags. The motto *Bear up*. Lieutenant Fulford is of the family of Fulfords, of Fulford, in Devonshire, a daughter of which, Mistress Faith Fulford, married John Davis, the great Arctic navigator and discoverer of Davis Straits.

Sub-Lieutenant Conybeare has per fess *sable* and *gules*, charged with a falcon. The rest as the other flags.

Early in March 1876 these flags will be crisply rustling over the sledges in the cold Arctic air, while the gallant crews are preparing for the great work of the expedition. The grand march to the Pole will occupy six or more sledges, and there will be explorations along the north coast of Greenland, and in other directions. That the expedition of 1875 will perform sledge journeys equal to those of 1851 and 1853-54 there can be no doubt, if the circumstances are equally favourable; and this will secure complete success. There will be the same appliances, neither better nor worse, the same hardships and perils, and

equally brave and gallant men to overcome them. But it is unfair and misleading to say that the present expedition is going out with greater advantages than were enjoyed by any that preceded it. The ships are more handy and are propelled by powerful screw propellers; but on the other hand they are not stronger, they draw more water, and the interior stowage is most seriously curtailed by the engine-room. The ships of former expeditions were warmed with hot air by a Sylvester stove, ensuring comfort and thorough ventilation, with a place for drying clothes, making beer, and bathing at a suitable temperature. The 'Alert' and 'Discovery' have no warming apparatus, and must rely exclusively on stoves for warmth and ventilation. The scales of provisions and clothing are practically identical. The present explorers have no advantages that were not enjoyed by their predecessors, and in some respects will not be so comfortable. They will have to face exactly the same difficulties, and to endure exactly the same hardships and sufferings. That they will manfully face and overcome them is certain; and their achievements will assuredly be great and honourable. They go forth, the vanguard of England's chivalry, to emulate the deeds of the old naval worthies of our nation, and to add another glorious page to its maritime history. The heartfelt wishes of every true Briton for success and a safe return go with them.

THE SALT FARMS OF THE LOIRE.

THREE or four days spent in the old city of Guerande, on the Lower Loire, were assuredly not thrown away last summer-tide. The place is ancient and picturesque enough in itself, with its machicolated walls of granite, its frowning gateways—formerly arches of triumph—and those curious sculptures and painted windows so frequent in this church and castle-crowded region; for not even over the great German River do more frequent shrines and fractured battlements impend. But, for the visitor who has only a little time to spare, the first attraction consists in the actual manners of the people; for, after all, though it may be heresy to think so, the living are more interesting than the dead. And here, more perfectly perhaps than in any other part of France, the costumes and customs of old Brittany are preserved.

It was during the great June fair that my short stay occurred, and when, apart from the invariable wealth of the season's fruits and vegetables, a mighty market is held of toys, of fabrics for peasant use, and of household utensils—tin especially—since they constitute a staple of the neighbourhood. But, amid all, there was a universal presence of salt—white and grey; and albeit already knowing that this valley was famous for the production of that substance, indispensable in nearly every zone of the earth, I had no idea that an entire population was engaged in cultivating it.

The Brittany folk, it should be said, by way of explanation, speak of their salt industry not as of a manufacture, but as of an agriculture. The earth and water, in their phraseology, must be regularly tilled, in order to yield the Arab symbol of welcome. Thus they say, "the swamp will flower soon," as though it were going to be covered with lilies; "the harvest will be

ready before long"; "the crop promises well," just as if they were talking of wheat or wine. Sallying forth among the little villages, scattered along the shores of shallow lakes, or rather ponds, lying below the crumbling fortress-like capital of the district, the stranger observes a distinct division of the ground. Here are trees of immense height and ponderous foliage, bordering fields which, when their riches fructify, are red with clover and yellow with corn; but these, without exception, flourish on the stony uplands. Below, in the vicinity of the saline marshes, nearly all is barren, except where a few roots—potatoes they style them—or a little moss, not bright and rich like that of the Black Forest, but of a lichen grey, vary the surface.

Some of the small hamlets have an animated and picturesque appearance; but so much cannot be said of the inhabitants. These, for the most part, although broad conclusions would not be justified by a flying visit, look poor, pale, and anxious; as, indeed, they are, in the midst of their "marsh-gardens," to which nothing, even in Lincolnshire, can be compared; large, oblong hollows raised amid artificial banks, a little above the common level, like the fish reservoirs on the Bay of Biscay; filled at high tide from the sea with water that has previously been stored for about a month, in more extensive tanks, and then distributed through miniature canals resembling those of the Chinese rice-fields, and continually drying up under the influence of evaporation. The process complete, a sediment of salt, more or less thick, according to the luck of the farmer, covers the bottom. Then the eager "salt-man," sometimes every day, sometimes every other day, furnished with a long rake, gathers in his "crop," and spreads it on the drier banks. It is interesting to watch the nervous care with which he avoids disturbing the oozy bed, thus efflorescing to his hand, or bringing any extraneous material ashore. Happy for him should the white expanse glisten like a sheet of subsiding foam; it is then of the crystallising kind, proper for the use of the sardine picklers.

But the pursuit, taken for all-in-all, is not a very profitable one. There is an excess of competition for the salt-farmers of this valley, fed from the far Cevennes, to contend with. As one fact, no other industry depends more utterly upon the vagaries of the weather. When the sun shines warmly, the lakelets sparkle with promise; when there is mist, or rain, or a cloudy sky, the people of the villages resemble the river population of London in the extreme of a freezing winter. You may know at one glance from the elevated windows of La Guerande, whether there will be an evening of songs and jollity, or sorrow and desponding among the people below. For nowhere exists a race more improvident, or more addicted to living literally from hand to mouth. How they get through the months, from the October of one year to the April, May, or June of another, passes all guessing. They have little more than twenty weeks in which to work; but this interval is never wasted. The men having collected their treasure, carry it to the large drying-pans or basins; there, with marvellous dexterity, considering the simplicity of the apparatus employed, it is shaped into cones, less like the sugar-loaves of commerce than the tents of a Tartar camp; and now the labours of the women commence. You see them heavily-laden,

bearing cumbrous wooden-trays, or osier baskets piled and pressed to the brim; then their store is either laid down with a thin covering of loose salt over it for the season's use, or else buried with a view to sale after the lapse of even three or four years—whenever, indeed, the market may be unusually active. But, in spite of all their efforts, these toilers of the miniature salt-lakes of the Loire are mostly poor; they share their gains in a very unequal way with the proprietors of the soil; and to the women, the payment for carrying their loads from the ponds to the store is sordidly insufficient.

Occasionally, when there are girls in the family, broad of shoulder and brown of limb, they earn a little by assisting their fathers or brothers; but, taken altogether, it is a wretched industry; far less remunerative than that of the fishermen who dwell at a distance of not more than 6 or 7 miles, along, perhaps, the most curiously broken and indented coast of Europe. Among them, however, you not unfrequently see hardy frames and contented faces; you hear pleasant songs, and see wholesome meals spread out on hospitable cottage tables; and there is an occasional liveliness among the sheds of the more fortunate sardine-fishers. Still, these workers between sea and land, never forget that they are subject to an oppressive and devouring tax, formerly much more burdensome than now; and, singularly enough, what makes their position worse is that the demand upon their supply is considerably less than it used to be.

Salted food, you are assured by the economists of the hamlets, is neither so popular nor so necessary as it once was in France, and the 10,000 villagers who reap a harvest from the marshes of the valley practice few of the ingenuities to be remarked among a similar class on the coasts of the Mediterranean. They are easily satisfied, in all conscience, with their coarse black bread, fish—taken in exchange for brown salt—a sort of sour cheese, not unlike stale Brie, a vegetable which might be a Jerusalem artichoke or an Australian potato for any place it holds in natural history, and a liquor, neither wine nor beer, watery and saline, which is simply one degree less detestable than the pine water extolled by doctors, of the Pyrenean forests.

Like all isolated communities, these salt cultivators have a dialect, or, if you will, a slang of their own, which, however, is easily translated. They do not think (as a French writer has already observed), that the men, women, and children of the earth have a right to expect plenty of food, and yearn for no happier valleys than their own. Strictly speaking, the word "health" is unintelligible to them. They leave their swamps fallow during seven months of the year, and woe to him who should suggest the draining of those miasmatic lagoons, or turning them to the purposes of a different cultivation! Yet they are not in every respect the slaves of custom. For example, I was assured that much of what I saw was comparatively new: the bleaching of the salt, the washing and refining houses, the substitution of horse for hand power, where steam has not yet entered, the lighter tasks set to children and the gentle piety prevalent. Nor is life, even upon these repulsive flats, one bleak and barren monotony. For, with the salt season, comes the fishing season, and sardines are in the offing.

There are few similar fisheries on the sea-board of

France, and certainly no such temptations to fishermen. It is all a succession of bays, roadsteads, inlets, and creeks; and every year, after the chapels have been adorned with gifts, and groups have kneeled at ghastly Calvaries, 300 craft, at least, swarm out in search of the sardine. "There's nothing to be got now-a-days, except thou fish for it," as the philosopher of the net said to the Prince of Tyre. But the sardine is a triple luxury, and would be as nothing without the salt of the Loire and the oil of Tuscany. An exulting time is it for the dwellers about the salt-basins when a lucky catch has taken place of that mysterious little fish which, caught by myriads in the Atlantic, comes nobody knows whence, though traditionally from the Southern seas, as its name suggests. It has been seen in large shoals, travelling along at a safe distance from the coasts of Finisterre; it has been described as first cousin to the Cornish pilchard. The people of the pans care nothing about these questions; they only ask, will it arrive, silvery and glistening, in mighty masses of life, brightening the sea, and actually concealing the water, in time for the pickling laboratories in, round, and about the feudal desolation of Guerande? Suppose the answer favourable. The scouts of the coast have reported that the sardines have been espied, coming on with the brilliant breeze, straight towards the milky foam that is shaken on the shore; and yet a temporary disappointment, even now, is possible. The shoal may have taken it into its many heads to dive, and will, perhaps, lie deep out of view for a fortnight; but up, in its turn, it must come, and then the summer sea reflects hundreds of white sails; the men put out gaily in their painted craft; women and children crowd the beach and sands; I should be sorry to guess at the length and breadth of twine net or the number of tin ladles put under requisition; but the excitement could hardly be more intense were an armada in the offing. The sea is literally swept by vast expanses of net, big I was going to say as the mainsail of a clipper, hanging perpendicularly, steadied by large plummets of lead, like the weights of a Dutch clock, and baited profusely. "The fish," you are informed by the local natural historians, "cannot get through the net, because their bodies are bigger than their heads; they cannot retreat, because they are entangled by their own gills;" the haul therefore is a pretty safe one; but the sardine requires a great deal of tempting. The irresistible dainty to this epicure is cod's roe, in which a regular commerce is carried on. Now and then, mackerel or shelled oysters will do; but not on any grand scale. Which accounts, the dealers affirm, for the high price of the genuine delicacy, since this item must be added to the varying cost of salt and oil, and the serious expense of packing. For the sardine sales must be immediate; the fish will not keep in a fresh state for more than a few hours; the women and children, therefore, as one boatload after another arrives, reckon up the contents with a dexterity and precision inconceivable, and send them off at such a speed as might suggest that the whole world was gaping for breakfast.

No breathing time is allowed; the glittering heaps are carried to the sheds, where the salt-workers are waiting, washed, pickled, plunged in boiling water, spread out to dry, laid in their beds of oil, and soldered in tin boxes, and stacked in immense heaps, ready for Piccadilly, Soho Square, Paris, St. Peters-

burg, Vienna, and Arctic Expeditions. All now depends upon two circumstances—the box being airtight, and the oil pure. A defect in either means "irretrievable ruin." It is hinted that a considerable proportion of the spoilt qualities find their way to the gold diggings of the New World.

This is the merry time of the year for the people of the pans; and the women, with their heads and feet bare, and in their short, brightly-dyed petticoats, swing along with contented faces beneath their coal-heavers' loads, and chatter noisily over their evening meal of dark and hard bread, and broiled fish—meat is unknown, even the swine-flesh which the German charcoal-burners can afford. To complete the feast there is soup, not exactly answering perhaps to Charles Lamb's *potage de Boulogne*, made from an old boot boiled in nine gallons of water; but consisting of soaked bread, a few vegetables, a handful of herbs, and an abundance of the native salt. In the winter, even this sort of plenty is often absent, and the poor folk lie in bed all day, on the French principle *qui dort dine*.

The general picture of life among these saline lagoons—of scattered and lonely cottages, of pale and pining countenances, of young and old, knowing nothing of any world beyond the circle of their little hamlets, except the prouder world perched upon the heights of La Guerande—is upon the whole, a sombre one, even with the bloom of summer to brighten it, and yet there are happy glimpses of beauty and simplicity that temper the sadness of the scene.

HORACE ST. JOHN.

KULJA.

MR. KHAROSHKIN, whom we have to thank for a good many valuable notices about Russian Turkistan, has lately published the account of a voyage undertaken to Kulja in 1873, which is based on official information, and contains many interesting statistical data. After the reports of Radloff and Welikhanow respecting Kulja, which at that time was still under Chinese rule, a more detailed discussion on the ethnical and geographical relations of the country would be quite superfluous, although the work of Mr. Kharoshkin presents many new features, especially concerning the Chinese and Dungan population. We will confine ourselves at present exclusively to the statistical portion, from which we obtain the following intelligence:—

The town of Kulja, situated at a distance of 3 versts from the banks of the Ili River, consists of the town proper and several suburbs. The former is surrounded by a wall of clay, about 6 versts in circumference. The principal street runs from the western gate named Köve to the opposite gate Dang, and is cut in the middle by the street Chan-Köche, running in a straight direction from north to south, to the gate called Su. Thus the town is divided into four quarters, each of which is traversed by a number of crooked lanes. Altogether 2167 houses and farm premises and 49 mosques are counted in the place.

The population of the inner town numbers 10,114 souls; the entire population, including the inhabitants

of the surrounding places, may be estimated in round numbers at 15,000. Of these there are:—

	Men.	Women.
Russians	1153	148
Taranjis	2980	2978
Chinese	814	846
Sartes	391	244
Dungans	274	259
Total	5612	4475

The great majority are Taranjis, descendants of those penal-colonists of Western Turkistan who the Chinese banished to these regions 100 years since from the rebellious province of Atti Shehir. After these follow the Russians, including the soldiers, whose number alone amounts to 1014 men. The Chinese are third in number, and the Dungans are considered the smallest fraction, which must be taken as a consequence of the late war, in which they were severely punished.

In regard to religion, the population of Kulja divides itself:—(1) into orthodox Russians, who possess at present but one temporary church-building. (2) Catholic Chinese, who, in former times, counted about 300 families, but are now reduced to 70 souls. These Catholic Chinamen settled in this region about 100 years ago, probably in order to escape persecutions in the interior of the empire. They possess a small chapel consisting of a large room, with an altar, above which a lithograph of the Archangel Michael is suspended, while upon the altar itself there lies a Latin Gospel of the year 1769, and a Chinese book, probably also a Gospel. Of late the Catholic Chinese begin to turn towards the Greek Church, which would afford a considerable nucleus to the missionary labours of the Greek clergy, whose efforts have hitherto remained utterly fruitless in Muhammadan Turkistan, but promises the most favourable results among the inhabitants of Dzungaria. (3) The Taranjis possess a large mosque, an old one-story high building, supported by 60 wooden columns, and besides this several smaller mosques and a shrine of pilgrimage, viz., the grave of Saïd Amir Jolala'din. There is also another memorable mosque of the Dungans, with a characteristic minaret. (4) Buddhists or Pagans, as the Russians call them, had a large pagoda, the façade of which is only now being built. The gloomy place destined for the reception of Bürkhan's or Buddha's image is already finished, as also the sacrificial shrine with the necessary thuribles.

The proportion of the various confessions is as follows:—

	Males.	Females.
Russian Church Members... ..	1044	119
Catholic Chinese... ..	71	47
Protestants	3	—
Muhammadans	3650	3307
Buddhists	809	802
Total	5577	4275

Commerce.—The commerce of Kulja is of very little importance, owing partly to the continual troubles prevailing in the East, partly to the general poverty of the country and people, who by the prolonged war were doomed to misery and desolation. The principal articles of commerce are clothing, cotton-stuffs, and tea from Vernoe, silk and woollen wares and other textile fabrics from Khokand and Kashgar, which are brought over the passes of Narin and

Müzart. There is also a good deal of trade in dried fruit, ironware, and fancy goods, which are imported partly from Khokand and Kashgar, partly from Petropaulovski and Semipalatinsk. The total imports of the town and environs of Kulja in 1873 were valued at 214,459 roubles. We must also mention the import of gold and silver jambes (massive gold and silver lumps used as currency), and of amber, which is manufactured into pipe-tubes, mouth-pieces, and various trinkets, as also into ornaments, decorating the hats of the Kalmuks and Sihos, to show their official rank. One pound of this article is valued at from 2000 to 3000 roubles. Concerning the export business, Kulja in the course of the above-mentioned year sent off to Khokand, Kashgar, Vernoe, Karaköl, Tashkend, and the neighbouring Chinese district of Selücha, the following articles:—jambes, grain, fruits, cattle, cotton, ironware, bags, and other fabrics, to the value of 279,193 roubles. Of Russian merchandize, wines and stearin candles are in great demand in the towns of Shikho, where Chinese troops are stationed at present.

Industry.—What little industry Kulja possesses is all due to the Chinese, who transplanted the taste for art, assiduity and skilfulness of their pigtailed race, even to these western outskirts of "the celestial flowery dominion of the Middle." Had the Taranjis and Kalmuks been left to themselves, or had they remained in a preponderating majority, Kulja would not be a bit farther advanced than either Yarkand or Aksu. The principal trades are the following:—founders, manufacturing kettles, plates, and other implements of a very primitive form; paper-makers, whose productions do not seem to be superior to the paper manufactured at the present time after Chinese patterns at Khokand and Samarkand. There are, moreover, some confectionaries in which cakes of all shapes are baked of rice and millet, overlaid with sugar; also macaroni-makers, the Taranjis being notoriously very fond of dried farinaceous food. In Eastern Turkistan there still exist many similar trades, and although their products are not equal to European articles of the same kind—I mean here the fabrics of the formerly western Chinese provinces—they are still said to be profitable. Finally among the tradesmen we may mention millers, vinegar manufacturers and potters. The number of factories amount to-day at Kulja to 38, wherein over 131 hands are occupied. To this of course other tradespeople have to be added, such as 169 boot-makers, 50 blacksmiths, 48 carpenters, 11 brass-founders, 3 silversmiths, 26 stone-cutters, and 2 tailors.

A. VÁMBÉRY.

KHIVAN MISSION TO INDIA.

MR. A. KUHN gives in the *Turkistan Gazette* an interesting account of a journey through Afghanistan to Simla, of the Khivan Envoy, who was sent in 1871, by the Khan of Khiva, to solicit the aid of the Viceroy of India against the then threatened Russian invasion of the khanat.

After the occupation of Khiva by the Russian troops, Mr. Kuhn found himself, during a scientific exploration of the country, in the town of Khanki, where he lodged in the house of Amin Bai, the Hakim or

governor. This man was universally respected in Khiva for his wisdom and justice. On discovering accidentally that it was his host who had proceeded to India in the capacity of envoy, Mr. Kuhn prevailed upon him to give him an account of his mission, and the description of his long journey, which is here summarised.

The father of Amin Bai, had, on more than one occasion, been sent as envoy to Afghanistan and India by Allah-Kuli-Khan, the predecessor of the present Khan Muhammad Rahim; therefore, according to prevailing custom, Amin Bai, succeeding to his father's office in the government of the town, inherited also his parent's itinerant capacity.

Amin Bai was summoned to Khiva, in the beginning of 1871, by the Khan Muhammad Rahim, who said to him—"I am going to send you on an embassy to England. During the reign of Allah-Kuli-Khan we were always in friendly relations with that State, but since then we have for a long time known nothing concerning it. You are, then, to proceed without delay to Hindustan, to acquaint yourself with the condition of affairs in that country, with the real disposition of the English towards us, or, in one word, to renew our old friendship. If thou art questioned as to our relations towards the Russians, thou shalt make answer that whatsoever they—the English—shall command us to do, that we shall perform; thou shalt, at the same time, deliver a letter, with gifts, and return to us with a reply thereto."

The envoy left Khiva on the 28th of February 1871, with a retinue of twenty-five servants, fifteen camels, twenty-three horses, and two mules. The sum issued to him to defray the expenses of the mission was 150 large gold tillas (tilla-pukhté, or ripe tillas = about 6s. 6d.), or about 50l.

At Naiman, a village distant about 21 miles from the capital of Khiva, the road emerges on the waterless desert, and as the mission had to perform three marches to Sahdja before reaching a well, the camels were laden with two leather bags of water each, each *tursuk* or bag containing twenty-five to thirty bowls of water. The marches were made, as usual, between midnight and dawn, and between 2 or 3 P.M. and 8 P.M. These tursuks were replenished at Sahdja for seven waterless stages south. The first march from Sahdja brought the caravan to a point called Yol-Airuti or Khivalik-Korum, where the track divides into one leading to Merv, and another to Akhal. The seven marches to *Murza-Chillia* were unrelieved by verdure or wells. Seven more marches brought the caravan to the Khan-Kui wells, dug in 1855, during an expedition to Merv from Khiva, and after two more marches the party reached Okshuk wells of brackish water. The country around these wells belongs to the Téké Turcomans, but it is not inhabited by them on account of the Er-Sary Turcomans, who swoop down on the herds when they are driven here to water. Two more marches brought Amin Bai to Chashkin, which was occupied by the encampments of the Seidli Bai tribe of Turcomans. This was by the lower course of the Murghab, and about five marches and 8 miles below Merv, yet Amin Bai observes that at the encampment of the Seidli-Bai, the river is equal in copiousness to the Shah-Abad Canal in Khiva. After several long marches the mission passed over to the encampments of Téké Turcomans, where it was most

hospitably entertained by Kausht-Khan, who lives in a tent outside a fort which is said to have been erected by the Khadjars of Persia about twenty years ago. The Tékés of Merv are said to number 50,000 tents, subdivided into Otamysh and Takhtamysh, the former camping on the southern side of the river, and the latter on the northern. Kausht-Khan is much respected by all the Tékés, and is the chief of the Takhtamysh division of the tribe, but the Otamysh have their own chieftain in one Annayar. The Tékés pay tribute to no sovereign, but their chiefs occasionally pay complimentary visits to the Khans of Khiva and Bokhara, and to the Sirdars (Generals or Princes) of Herat. Kausht-Khan is by no means a ruler as are the Khans of Khiva, Bokhara, or Kokand, and is styled khan only by courtesy. He has not got the power of life and death, which is exercised by the community according to old custom, and criminal cases are decided by kazis or judges, who hold patents either from Bokhara or Khiva. Kausht-Khan and his family reside in six tents within his *sengar*, as all the Turcoman forts are called (meaning a plain space, enclosed within a mud wall and trench). There is a garden with a vinery and various fruit-trees, and several mehman-khanes or guest-houses. The Turcomans dwell all over their spreading corn-fields in the summer, but in the winter they concentrate in groups of about a hundred tents around the *sengar*. A bazaar is held close to the *sengar* on the banks of the river, where traders from various parts, and among them Herat Jews, carry on a lively business, buying up wool, cattle, carpets, and felts, and selling their cottons, &c. These traders are in the habit of depositing portions of their merchandise with the Turcomans, while they travel over the country to traffic with the various outlying tribes. Yet, according to Amin Bai, there has never been an instance of the abuse of this trust by the Turcomans. Amin Bai noticed that there was no great quantity of English goods in the bazaar, that there was more Russian merchandise brought by Khivans and Bokharians, but that the Tékés had apparently a plentiful supply of English arms, acquired, he observes, partly by robbery, and partly through Herat traders.

A march of 6 Khivan tashes or 6 miles, from the *sengar* of Kausht-Khan, brought them to the dam on the Murghab. This dam serves to divert the water into two large canals for the uses separately of the Takhtamysh and Otamysh encampments. The length of this dam or *bend* is 38½ yards by about 28½ yards wide. Each side of the dam is guarded by a camp of 500 Turcoman tents under Hakim Bai. Amin Bai observes that the city of Merv (as it exists at present) is said to be about 8 miles up stream from the dam, from which, as well as from his omission of any other mention of Merv, it is to be concluded that he did not enter Merv, and that the site of the present "city" is not the branch of the Murghab, along which the Khivan Envoy travelled. From the Bend to Yulatan, called *Yolvaten* by Amin Bai, was a distance of 6 tashes (presumably Khivan tashes = 1 English mile each; the Persian tash or parasang = about 5½ miles). Yulatan and Pend (5 marches beyond or above Yulatan) are the head-quarters of the Saryk Turcomans. Sayun Khan, their chief elder, camps at Yulatan, while Ada-Khan, a subsidiary elder, camps at Pend. At both places which are on the south side of the river, there is a

small Turcoman *sengar*. The Saryks are said to number 20,000 tents: there is a small bazaar at Yulatan. From the encampment of Kausht-Khan to Pend the road is good and even, with occasional patches of sand, and with clumps of bushes; water is procurable from the river all the way to Pend. There may be seen the ruins of a fort around which are pitched some 8000 Saryk tents. From thence to Herat is a good caravan route passing by the Khatcha stream through *Chungurak* and Keshk on the frontier of Afghanistan. The latter place is in the occupation of the Djemshidis, a pastoral tribe divided into four branches, Djemshid, Hazar, Teiméné, and Parkliu, who now number about 7000 tents. These people formerly dwelt in Khiva, and have not long settled at Keshk.

Amin Bai was 18 days in Herat, which place he left, in company with Nauruz Khan, an uncle of Yakub-Khan, then governing in Herat, on the 10th of May, reaching Cabul in twenty-six days or twenty-six marches. While in Cabul, Amin Bai witnessed the arrival of a Bokharian Envoy with that of an Afghan return envoy from that place. The object of this mission he could not discover, but he was told that the Bokharian had brought the Amir some very valuable gifts. He ascertained among many other things concerning Cabul and Afghanistan that there were very few English in the city, that the Amir's revenue amounted to one *crore* of rupees. It was said in Cabul that the English had ordered Shere-Ali to build a fort at Balkh on the banks of the Oxus. Shere Ali Khan, he ascertained, had 40,000 infantry, 10,000 cavalry, and 150 guns; these troops were always ready for war, and were all supplied with English arms. During his stay in Cabul, the English sent the Amir 100,000 rupees, 2000 stand of arms, and 1000 recruits. Later, on his way back through Cabul, Shere-Ali gave orders for the formation of a corps, composed of those recruits, for his youngest son Abdullah-Jan; the instruction and maintenance of this corps was undertaken by the English. The Amir's relatives and rivals for the throne were all in India, and judiciously made to reside under the eyes of the authorities of Lahore and thereabouts. So far as Amin Bai could observe, the Afghans of Cabul were hostile to the Russians. In Cabul the Khivan Envoy was very well received and amicably entertained. Passing through Peshawur, Lahore, and other places, which he very faithfully describes, while he gives an account of the British garrisons and forces on his line of route, the Khivan Envoy reached Simla, where he had an interview with Lord Northbrook, to whom he presented his letters and presents, and from whom he got the memorable answer that the English Government declined to aid the Khan of Khiva in the event of hostilities with Russia, coupled with the advice to cultivate friendly relations with the Russians. After a stay of fourteen days at Simla, Amin Bai departed with Lord Northbrook's reply to the Khan, observing in conclusion of this narrative:—"The English, in my opinion, govern the country very well, and deal with their neighbours very dexterously; their people are visible everywhere, all are in their pay; thus the Afghan pretender—Ismael Khan, son of Madalin, (Muhammad Amin), receives 500*l.* a month; Jelai-Eddin-Khan [Jalaludin], son (grandson?), of the late Dost Muhammad receives 350*l.* a month; Mashrif-Khan [Muhammad-Sharif] and his family

receive 750*l.* a month. It is difficult to understand whom the Afghans want as their ruler. The Heratees want Yakub-Khan, the Cabulese want Shere Ali's youngest son, the people of Balkh and the other northern provinces want Abdu Rahman, the inhabitants of Candahar want Ismael Khan.

Amin Bai returned to Khiva by the same route, after an absence of eighteen months.

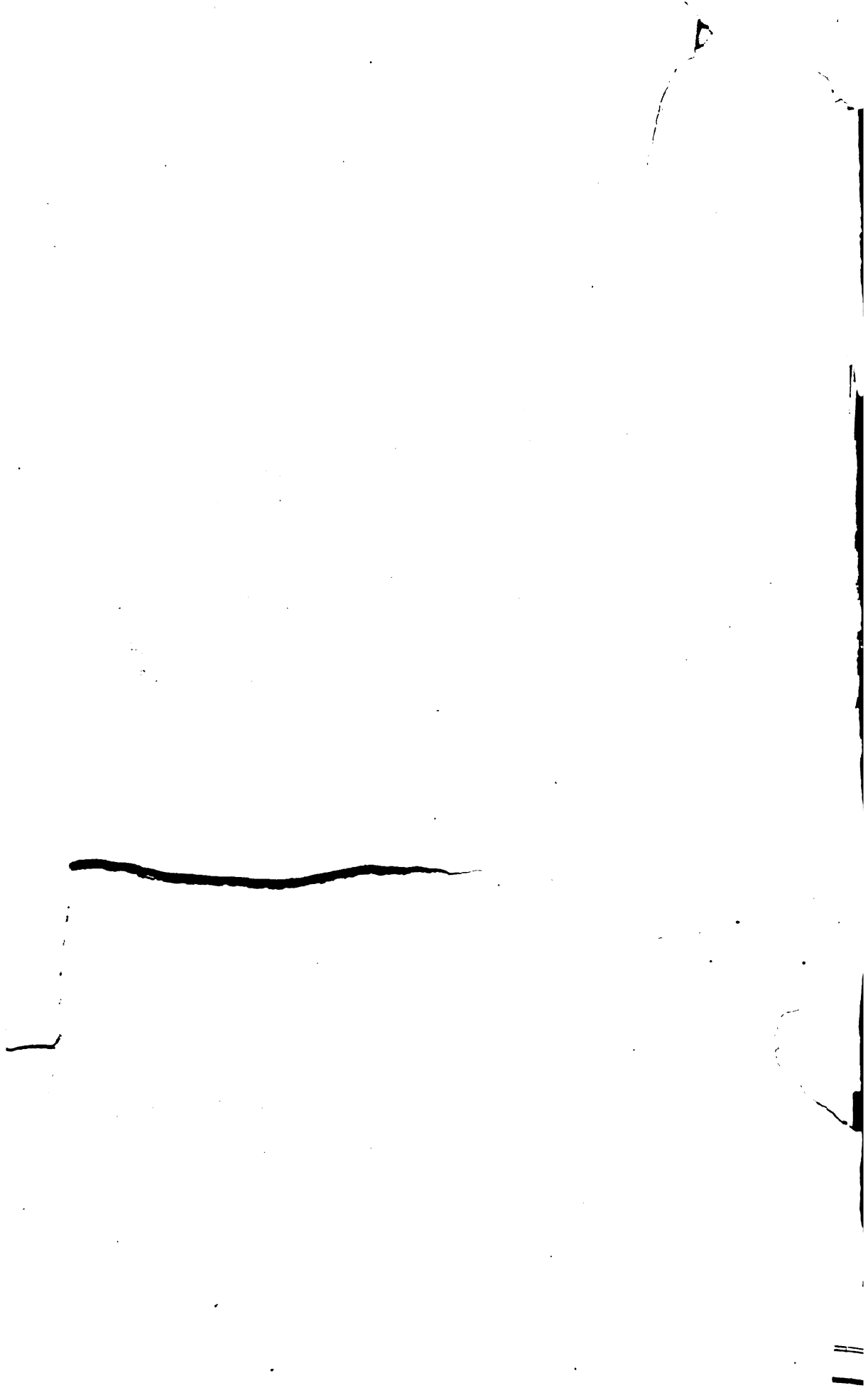
ROBERT MICHELL.

NACHTIGALL'S TRAVELS IN AFRICA.

IN a former number of this Magazine* we have rendered a full account of Dr. G. Nachtigall's remarkable travels in Africa, from his departure from Tripoli, in February 1869, to his safe arrival at el-Obeid, in Kordofan, in 1874. We now supplement this account by a map based, almost exclusively, upon the map of Tibesti, published in Petermann's *Mittheilungen*, and the maps of the region to the north-east of Lake Tsad, of Bagirmi and of Wadai, published in the *Zeitschrift für Erdkunde* of the Berlin Geographical Society. The red lines, indicating Nachtigall's routes, exhibit at a glance the extent and direction of his travels, and it should be borne in mind that most of them lead over virgin soil, not previously trodden by the foot of European. There is first of all his journey into Tibesti, the home of the lawless Tibbu Reshade; then his expedition to Borku, and to that remarkable sink in the desert, "Bodele," at an elevation of less than 400 feet above the sea and connected with Lake Tsad by the Bahr-el-Ghazal, through which the superabundant waters of that lake even now occasionally discharge themselves during exceptionally wet seasons. Bodele, in former times, was occupied by a lake, and its present condition furnishes a proof of the desiccation of Central Africa. Nachtigall's trip to Southern Bagirmi likewise supplied a rich store of information, but far more important was his journey to Wadai and thence to Kordofan, which had been attempted by Vogel and Beurmann, both of whom fell victims to their ardour. Dr. Nachtigall's achievements are all the more remarkable if we bear in mind his chronic insolvency, due, in a large measure, to the mismanagement of M. Rossi, the Austrian Consul, who was charged with forwarding his financial supplies.

Dr. Nachtigall has collected a vast mass of native information; amongst the itineraries inserted upon his preliminary maps, one leading to the Bahr Kuta is perhaps the most interesting. There can be no doubt that this Bahr Kuta is identical with Barth's river of Kubanda and Schweinfurth's Welle. Nachtigall was told that this river exceeded the Shari in width, and flowed west to the countries of the Fellata, the nearest of which is Adamaua. This would point to its identity with the Benue. Schweinfurth, on the other hand, feels convinced that his Welle represents the Upper Shari, and we believe Dr. Nachtigall will arrive at the same opinion after having carefully sifted the information collected. If our readers will refer to the map they will find there the route of one of Nachtigall's servants, which leads to a river Bahr Kutu, near which dwell the Mbagga and Ngama. Near the Bahr Kuta there is likewise a tribe called Mbagga,

* October, 1874.



whilst Ngama is represented by a village Ngamasa. This coincidence would almost justify us to believe that Bahr Kuti and Bahr Kuta are one and the same river, and the connection between Welle and Shari would thus be established.

Nachtigall appears to have heard nothing with respect to the lakes said to exist to the south of Bagirmi. It is just possible that these lakes will turn out to be mere "pools," numbers of which are to be found on our map. Fresnel's lake, Bahr Abiad, said to lie at a distance of 30 days' journey to the S. or S.S.W. of the Bugdi Lake, is represented on Nachtigall's map by a river of that name, and the lakes described by Sultan Teimza and Muhammad el 'Tunsy, as lying three or four months to the south of Dar-For and Wadai, are referred to in too vague a manner to admit of their being placed upon the map.

Dar-For has recently been annexed to Egypt, and is being explored by a scientific commission, whose labours must, in a great measure, supplant the information obtained by Nachtigall. Our map illustrates the short sketch of the conquest of Dar-For given in the *Geographical Magazine* of last January. The "Seribas" or trading-posts of the Ziber referred to there lie between latitude 8° and 9° N., and the districts brought by him under the dominion of Khartum extend thence to the frontiers of Dar-For proper. He invaded Dar-For from the south, and the Turkish Pasha, whom Nachtigall met on his arrival at el-Obeid, was able to take possession of the country without striking a blow. Some interesting information respecting Ziber's previous doings will be found in Schweinfurth's *Heart of Africa*, vol. ii., p. 360. The ruler of Wadai is described by Nachtigall as a man of intelligence and energy, desirous of entering into relations with foreign countries. It is to be hoped he will avoid boundary disputes with his new neighbours.

Dr. Nachtigall is still in Egypt, recruiting his health. The publication of his journals must be looked forward to with considerable interest, in spite of the many papers already published by him.*

THE PARIS GEOGRAPHICAL EXHIBITION is not likely to be very complete as far as the exhibition of maps is concerned. We learn from a correspondent abroad that the French Commissioners have neglected to ask the German Government to appoint a Commissioner representing Germany, though they refuse to receive articles for exhibition unless they are forwarded through an official representative. The Berlin Government has not thought proper to waive etiquette, and make the appointment without being specially invited to do so. The Bavarians, more humble, and anxious to show to the world that they still retain some shreds of sovereignty, have not waited for an invitation; but then they have scarcely anything to show except government maps. We hope there is still time to arrange this matter, for the absence of the great German map-publishing firms would be matter for regret.

* The more important of these have been published in the *Zeitschrift* of the Berlin Geographical Society, viz., *Tibesti and the Tibbu* (vol. v., 1870), *History of Wadai* (vol. vi., 1871), *Journey to Kanem and Borku and to Bagirmi* (vol. viii., 1873), *History of Bagirmi* (vol. ix.), *Journeys in Wadai* (vol. x.). Petermann's *Mittheilungen* contain accounts of the journeys to Tibesti (with map, 1870), and from Murzuk to Kuka (1871), besides numerous shorter communications.

Reviews.

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CLIMATE AND TIME.*

SINCE it has been generally acknowledged that in the northern hemisphere a glacial or icy period at one time prevailed, while in Greenland, Spitzbergen, and other parts of the Arctic Regions, now covered with ice, evergreen oaks, magnolias, and other semi-tropical or temperate plants grew in a geological period so recent as the miocene; or, extending further back into the past, that Melville Island, during the carboniferous period, supported a rank tropical vegetation, the cause of this strange change in the climate of certain portions of the earth has excited the attention of some of the deepest thinkers, and soundest generalizers of the age. Chief among these is the author of this work. For ten or twelve years past, in different scientific journals, he has promulgated his views on the subject, and these, though at first naturally opposed by the authors of rival theories, have been gradually accepted by many of the geologists and astronomers best calculated to judge of the stability of the data on which his conclusions were based. At this juncture, we think Mr. Croll has done well to collect his scattered papers, and edit them, with much additional matter, for preservation in the handsome volume now before us, the value of which is enhanced by many beautiful maps and diagrams. After an author has spent half a lifetime in making a subject his own, it is manifestly impossible, if it were just, to curtly dismiss his labours in the few lines we can devote to them. We can therefore only indicate generally the line of argument he has adopted, and refer the reader for full details to the work itself. In an introductory chapter he presents the salient points which he endeavours to make out in subsequent pages. The ocean currents in relation to the distribution of heat over the globe, the physical agencies which lead to secular changes of climate, the reason why the southern hemisphere is colder than the northern, an examination of the gravitation theory of oceanic circulation (including Maury's and Carpenter's theories), the wind theory of oceanic circulation, warm inter-glacial periods in the Arctic and other regions, former glacial periods, geological time, probable age and origin of the sun, a method of determining the mean thickness of the sedimentary rocks of the globe, the physical causes of the submergence and emergence of the land during the glacial epoch, the influence of the obliquity of the ecliptic on climate, and on the level of the sea, coal an inter-glacial formation, path of the ice-sheet in North-western Europe and its relation to the boulder clay of Caithness, north of England ice-sheet, and transport of Westdale crag blocks, evidence from buried river channels of a continental period in Britain, the physical cause of the motion of glaciers, and the theories of glacier motion, are among the subjects discussed in the volume, and present a bill of fare very tempting to the physical geographer. Rejecting the once very generally adopted theory

* *Climate and Time in their Geological Relations: a Theory of Secular Changes of the Earth's Climate.* By James Croll, of Her Majesty's Geological Survey of Scotland. Dalry, Isbister & Co., 1875.

of Lyell, that the changes of climate which have occurred in the geological history of the globe are owing to changes in the distribution of land and sea, the learned author of the book before us is inclined to adopt, with many modifications, the views of Herschell. He points out that though no great change of climate could result *directly* from an increase of the eccentricity of the earth's orbit, yet it might do so indirectly. The deflection of ocean currents Mr. Croll points out as being by far the most important physical agency concerned in this change of climate by an increase of eccentricity. During the period of greatest eccentricity of the earth's orbit, the hemisphere winter solstice of which happened then to be in aphelion, would have its temperature so lowered that most, if not all, the moisture which fell would be in the form of snow, which the utmost intensity of the heat of the succeeding summer would be unable to melt, owing to the shortness of the season. On the other hand, when the winter solstice happened in perihelion, the winters would be mild and short, succeeded by very long summers; so that snow would year by year be accumulating in one hemisphere, while in the other there would be all the year round a mild, genial climate. Other results would follow this state of things. The trade-winds of the colder hemisphere would be stronger than those coming from that under a milder climate, and would therefore blow across the equator into the latter. This would tend to deflect the ocean currents, and Mr. Croll at great length defends those views now so well known, as being associated with his name, viz., that ocean currents are caused by the impulse of the prevailing winds of the globe regarded as a general system. Having enunciated and supported this doctrine by many, and it must be acknowledged sound arguments, he proceeds to demolish in a most ruthless manner the opposing theories of Maury and Carpenter. The theory of Dr. Carpenter is like everything emanating from his versatile and subtle mind ingeniously beautiful: but we can hardly think that anyone who reads Mr. Croll's exhaustive criticism of it (pp. 220-225), will assert that it rests on any sure foundation of fact. The overthrow of Maury's is apparently equally thorough. Mr. Croll shows that there must have been several "glacial periods," alternated with warm spells, and that the coal-beds are evidence of one of these warm periods—a view so startling that we question if it will receive such general acceptance as the rest of the doctrines broached in his work. He has laboriously calculated (by means of Leverrier's formulæ) the eccentricity of the orbit for 3,000,000 years in the past, and is thus able to fix an approximate date for the last glacial period, and also for the eocene and miocene ages.

He is inclined to refer the date of the formation of the till and boulder clay to a period extending from about 980,000 to about 720,000 years ago, and the period during which merely local glaciers poured down the Highland glens at from 240,000 to 80,000 years ago. Such is a brief account of some of the numerous important questions discussed in this work. No one—however he may be inclined to differ with Mr. Croll in some particulars, and when such questions are before us unanimity of opinion is neither to be expected nor desired—can rise from the study of this work without being convinced that it contains the

results of the life study of a laborious, learned, and conscientious man, not so wedded to his own views as to be unable to do ample justice to his opponent's, nor so blind to the true end of the science of which he is so distinguished an exponent, as to forget that "the true philosopher loveth truth better than his theory." Throughout the book we have noted how anxiously he has avoided—with every temptation to an opposite course—mere hypothesis, but has endeavoured to support every statement or view by ascertained facts. To compare *Time and Climate* with Lyell's *Principles* would be to compare the "Principia" of geology with a work which has obviously emanated from a mind imbued with its mode of reasoning. But we are not saying too much when we affirm that Mr. Croll's treatise will in the department of geological philosophy which it discusses, rank alongside the great work of the dead master, will secure the reputation of its author, and add to that of the scientific department with which he is connected.

GREAT TRIGONOMETRICAL SURVEY OF INDIA.*

THE Annual Report of the Great Trigonometrical Survey of India for the official year 1873-4 will be found to be of great interest. During the year the principal triangulation was extended over an area of 7190 square miles, the secondary triangulation over 5212 square miles, which have been closely covered with points for topographical operations, an area of 3650 square miles was operated in, *pari passu* with, but exterior to, the principal triangulation, and in an area of 12,000 square miles in the mountain-ranges north of the Assam Valley, a large number of peaks were fixed, many of which have already been found serviceable in the military expedition against the Dufflas, while topographical surveying progressed in the Himalayas, in Kattywar, Guzerat and Dehra-Dun. Of geographical exploration, much valuable work was done in Kashgaria and the Pamir Steppes in connection with Sir Douglas Forsyth's mission to the court of the Atalik Ghazi, and important additions to the geographical knowledge of Great Tibet and Nepal have been obtained through the agency of native explorers.

Turning to the various parties engaged in the operations of the survey, we must notice first that under Major Branfill. This party succeeded in revising the last bit of the southern portion of the Great Arc measured by Colonel Lambton at the beginning of the present century, and of which a revision had long been deemed essential, owing to the greater accuracy of modern instruments. The last of the old links in the great chains of triangles have thus now been made strong and on a par with the best modern triangulation. During the measurements, search was made for one of Colonel's Lambton's stations, erected by him on the highest point of some red sand-hills. Although the station was not discovered, its site was, at the remarkable distance of 1060 yards from its old

* *General Report on the operations of the Great Trigonometrical Survey of India during 1873-74.* Prepared for submission to the Government of India, by Colonel J. T. Walker, R.E., F.R.S., &c., Superintendent of the Survey, Dehra Dun, 1874.

position, proving that the progress of these sand-hills, which is so irresistible as to overwhelm villages and fields in its course, is at the rate of 17 yards a year. One of Major Branfill's party, Mr. Bond, managed to get an interview with a couple of the wild folk, who inhabit the hill jungles of the Western Ghâts, to the south-west of the Palanei Hills. They are a strange dwarfish race, the man bearing a good deal of resemblance to a monkey. Their principal food is wild roots and honey, and their general condition of life most rude and primitive. Major Branfill made arrangements for connecting the triangulation of India with that of Ceylon; having previously made a reconnaissance of the Straits of Manaar with a view to select the most suitable point of juncture. This appeared to be the island of Kachi-tivu, a small coral and sandstone island, on which it will be feasible to erect two stations visible from the islands of Ramesweram and Neduven-tivu, to the west and east respectively. The angles will have to be very acute owing to the small size of the intermediate island, and Major Branfill will consequently measure these with one of the first-class theodolites of the Indian Survey. Colonel Fyers, R.E., the Surveyor-General of Ceylon, is taking great interest in the proposed operations, and everything augurs well for the success of the project, which will be further completed and enhanced in importance by the incorporation of the marine surveys of the Gulf of Manaar, now being carried out under Captain Taylor, late I. N.

In the Assam Valley the triangulation was advanced a distance of 47 miles through the forest-clad plains on the south bank of the Brahmaputra, progress being much retarded by the concomitant difficulties which have always hindered the surveyors in this region. The Brahmaputra series on the meridian of 90° was also carried northward for a distance of 54 miles, and a junction effected with the Assam series. The work of the Jodhpur series lay in the desert of Marwar and Jesalmer, which has been called "the region of death" by Greenough, a name probably suggested by its desolate appearance, the frequency of its famines, and the distress and disease generally prevalent among the poorest inhabitants, owing to the miserable food and unwholesome water on which they are compelled to subsist. Special arrangements had to be made for the provision of food and wholesome water, but camels were readily obtained, and altogether excellent progress was made by Captain Hill and his assistants, the principal triangulation being carried along a distance of 90 miles, by a series of polygons covering an area of 1552 square miles.

The Eastern Frontier Series in British Burma had been discontinued in 1870, in consequence of the financial embarrassments of the Government, but this year it was ordered to be pushed forward with vigour, with a view to fixing points for the Revenue Surveyors, who were to commence operations very shortly. Burma is thinly populated, wages are high, and the country is covered with dense forest, all of which serve to raise the contingent expenditure to about three times what prevails in India Proper. Nevertheless fair progress was made, and stations were selected for a secondary chain of triangles to connect the important towns of Rangoon and Pegu. Turning to the Madras Presidency, we observe that a useful work is being there carried out under Lieutenant Har-

man, the connection and reduction to a common datum of the several lines and systems of levels executed for railways, canals, and other public works, and the checking of the heights of the principal stations of the survey.

A great achievement has been made in the survey of Guzerat, by Major Haig, in combining the Revenue Survey, which had been made solely with a view to fiscal purposes, with the more accurate work of the scientific survey. It would have been a great pity if the myriads of measures which had been made for the purpose of defining the areas of all landed properties—down to the minutest fields, and which had been plotted together so as to form village maps on the large scales of 8 and 16 inches to the mile—could not have been utilised. Happily, the pains taken by Major Haig to incorporate these details into his survey have at length been successful, and he has been able to effect an excellent survey, on the scale of 4 inches to the mile, of a good portion of this rich province.

The importance of forest surveying has been now recognised in India. Captain Bailey was appointed as superintendent of the department for carrying this out, and was directed also to commence operations, under the superintendence of Colonel Walker, by surveying the Dehra Dun Forests, which are not far from the head-quarters of the Great Trigonometrical Survey. Two sorts of maps are wanted by forest officers, working or detailed maps on a large scale, so as to exhibit the greatest possible variety of topographical and other details; and general maps on small scales. The scale adopted by Colonel Walker for the first-mentioned maps is 4 inches to a mile; and the non-forest tracts in Dehra Dun are being surveyed on the same scale by Captain Thuillier, with a large proportion of native agency, by which the cost is much reduced.

Captain Baird has been observing with tide-gauges at the head of the Gulf of Kutch in order to determine if secular changes were taking place in the relative level of land and sea. Three suitable stations were discovered where the water was sufficiently deep, but there being no piers or embankments for the erection of these tide-gauges, and the construction of stagings in the sea being too costly, walls were sunk in the shore and connected with the sea by means of iron piping. Blocks of stone were sunk in the ground at short distances round each station to serve as bench marks for future references, and each of them was carefully connected with the zero of the tide-gauge. The inspection of these stations necessitated much hard work and privation. Already in May the Runn of Kutch was covered with water from 6 inches to a foot in depth, which had to be waded through by the travellers on camel back. On one occasion, indeed, the only landmarks in the last 14 miles of the journey were two small mounds of earth and the tidal observatory itself, and a curious sensation was felt by the travellers as if they were being carried out to sea, which was occasioned by seeing small branches of scrub floating on the surface of the water, and driven by the wind inland, and there being moreover no fixed objects to destroy the illusion. In the monsoon months the passage could not be made in native boats, and so a long detour had to be accomplished round the head of the gulf, and the Runn crossed at

its narrowest point. At Okha the registrations have progressed satisfactorily; at Hansal there have been short breaks owing chiefly to the deposit of fine mud in the well and piping, but at Nawanár the monsoon caused a vast amount of sand-drift to accumulate, and form a sand-pit over the line of piping, where formerly there had been 20 feet of water at low tide. This clearly proved the site to be unsuitable for continuous observations. From the preliminary results of the observations, it appears that the greatest range of the tide is from 2 to 4 feet more than the ranges given in the marine charts.

The pendulum operations were completed last summer by Captain Heaviside, and the results prove that at the ocean and coast stations there is an increase of actual vibrations over the theoretical number, and that an increase has invariably been met with in proceeding along a parallel of latitude from the main land to the ocean, and a marked decrease in proceeding up the main land to the Himalayas. This is incontestible evidence that there is a diminution of density in the strata under the earth's crust which are under continents and mountains, and an increase of density in the strata under the bed of the ocean.

The interesting narratives of an exploration of the Namcho or Tengri Nur Lake has already been noticed in our columns, and a summary of the narrative of a native explorer of his journey from Pitoragarh in Kamaun, *viâ* Jumla to Tadum, and then down through Nepal, along the Gandak River into British territory, which claims interest, will be found in the Log-Book of our present number. The most extensive and valuable geographical acquisitions, however, during the year have been made in Kashgaria, and the western portions of Eastern Turkistan, where Captain Trotter carried a survey through the Artysh Valley up to the Russian frontier, at Lake Chadyr Kul, and though he was disappointed in his expectation of being able to strike off eastwards to the Terekty Pass, and return by the road from there to Kashgar, he succeeded in satisfactorily connecting his work with that of the Russian geographers. He subsequently made a survey of the road towards Ush Turfan to the north-east as far as the Belowti Pass, 150 miles from Kashgar. Captain Bidulph also surveyed the road eastwards to Maralbashi, but no opportunities presented themselves for reconnoitring the 700 miles of the Atalik Ghazi's country eastwards. Captain Trotter afterwards surveyed the route from Yangi Hissar to Tashkurgan, and thence across the Little Pamir to Kila Panja in Wakhan, and was enabled to send a native surveyor down the Panja to Kila Wamar in Roshan, as mentioned in our number for April last, p. 118. The captain himself returned to Aktash, *viâ* the Great Pamir and Lake Victoria, and thence to Yarkand by the same route as before. One of the Hindu explorers was sent into Khotan, *viâ* Sanju, with instructions to penetrate as far east as possible. He traversed the ancient road to China, as far as the Sorghak gold-fields, then struck southwards, crossed the Kuen Lun Range and the great table-lands of the higher Himalayas on the western confines of Chinese Tibet, until he was stopped by the Chinese officials at Noh, about 20 miles north of Rudok. His work was very carefully executed, and has stood the usual tests furnished by comparing the route survey with the astronomical and trigonometrical determinations of position most satis-

factorily, and this is all the more important in the present instance in that large corrections have been shown to be needed in the work of 1865-66, which has hitherto been accepted, though with some misgivings.

The computing branch of the Survey has been engaged in carefully examining and reducing the observations. The third volume of the account of the operations is ready for publication, and the fourth is all but completed; while the second, which is intended to give a brief history of the operation, and a full description of the procedure adopted, the instruments employed, and the formulæ and methods of computation by which the results have been obtained, will be finished probably by the end of 1875. Those of the synoptical volumes of results, devoted to the Great Indus Series, the Great Arc Series, Section 24° to 30°, and the Karachi Longitudinal Series respectively, have been completed, and three more volumes are nearly ready for publication.

In the Head Quarter's office of the Trigonometrical Survey, a memorial in the shape of a clock has been erected to Captain Basevi, whose life was lost through exposure incurred on high table lands of the Himalayas, while engaged in the pendulum observations. His name will thus be perpetuated among those by whom his labours must be best appreciated.

Among the various maps prepared by Colonel Walker's department, may be mentioned a map of Kumaun and Garhwal and several of the level charts, showing the systems of levels for railways, canals, and other public works. Preparations have also been made for the publication, at an early date, of a third edition of the Turkistan map, into which will be incorporated a large amount of valuable and recent information derived from the Director of the Topographical Branch of the Russian War Office, the results of Captain Trotter's surveys, and the new work of Colonel Montgomerie's Havildar, whose return to Colonel Walker's office, after an interesting exploration of Cabul and a portion of the Oxus, has by this time probably taken place.

A GERMAN MANUAL OF SCIENTIFIC INQUIRY.*

It cannot be denied that many of our explorers start upon their travels but ill-prepared for the task they have set themselves, and that their explorations do not consequently yield the results which might have been attained under more favourable circumstances. There are, moreover, numerous residents in foreign countries whom inclination leads to the collection of specimens of natural history, or of information respecting the country in which they dwell, and whose labours would prove more advantageous to science if their attention were directed to those points which are of real importance.

The "instructions" now before us are intended for these two classes of persons. The *Manual of Scientific Inquiry*, published by the Admiralty, has been their prototype, but the plan of the English work has been modified to suit the requirements of

* Anleitung zu wissenschaftlichen Beobachtungen-auf Reisen. Herausgegeben von Dr. G. Neumayer. 8vo., pp. 702. Berlin, 1875. (London: T.übner & Co.)

German readers, and several branches of inquiry have been added or extended. The work is edited by Dr. G. Neumayer, the Director of the recently established nautical observatory at Hamburg, who brought to his task considerable experience in various quarters of the globe, and who has succeeded in gaining the co-operation of a body of men of mark and practical knowledge. The scope of the work will best be appreciated from a short statement of its contents.

Dr. Förster explains the methods for determining the distances of celestial bodies, with special reference to the transits of Venus; Dr. F. Tietjen explains how to observe latitude and longitude, and Dr. E. Weiss furnishes an interesting paper on the observation of celestial phenomena generally.

Hydrography is represented by the editor, who enlarges most lucidly upon all subjects of enquiry coming specially within the range of seamen, and his paper is supplemented by one on tidal observations, by Dr. C. A. F. Peters.

Prof. H. Kiepert shows how to make a flying survey, and Dr. Koner contributes a paper on geographical terminology, which may be read with benefit by all those engaged in the study of German geographical works.

The collection and preservation of specimens of natural history is exhaustively treated in a series of papers by R. Hartmann (mammals), G. Hartlaub (birds), G. Günther (fishes and reptiles), K. Möbius (invertebrate animals), Gerstäcker (articulata), E. von Martens (molluscs), and G. Schweinfurth (plants). Dr. A. Oppenheim writes on the collection of gases and other products with a view to their chemical examination.

Geology has found a worthy representative in Baron Richthofen, whose experience in nearly every quarter of the globe entitles him to speak with great authority. His contribution to this volume is supplemented by one on Seismology, by K. von Seebach, who has made that branch of geological inquiry his special study.

The claims of anthropology are most ably advocated by R. Sirochow, A. Bastian, H. Steinthal (who enters also into methods of spelling, recommending for that purpose Lepsius's standard alphabet), and Dr. K. G. A. Friedel, whose suggestive paper treats on physiological and medical inquiries. In conclusion, there are contributions by Dr. A. Meitzen, on political geography and statistics, by A. Orth, on agriculture, and last but not least, by G. Fritsch on the use of the microscope and photographic apparatus.

The tenor of all these papers is eminently practical. Theories are referred to where necessary, and the titles of the works in which they are discussed are given, but the practical requirements of the explorer and collector have been considered of paramount importance by every one of the contributors named. This is as it should be, and has made it possible to dwell upon certain subjects at far greater length than is done in ordinary text-books. Yet, in spite of every desire to render this a compact and portable work, it has assumed very large proportions; it is so bulky, in fact, as to render its transport during extended journeys a matter of considerable inconvenience.

Every traveller ought certainly to possess some knowledge of the subjects treated of in this volume, but this knowledge, in most instances, can and ought to be acquired at home, before he starts upon his

journey. This applies particularly to surveying, to the use and handling of instruments, to the preservation of skins, &c. We are, therefore, of opinion, that by judicious excision and contraction a useful "Handy Book," "Remembrancer," or "*Merkbüchlein*," might be produced. Supplemented by carefully prepared maps and other information of the country about to be visited, and by a few tables, a book of this kind would undoubtedly meet the wants of a traveller actually "in the field." If Dr. Neumayer can be prevailed upon to undertake the task thus pointed out to him he will, we feel sure, meet a want felt by numerous travellers.

ROUGH NOTES OF JOURNEYS MADE IN THE YEARS 1868-73, IN SYRIA, INDIA, JAPAN, AUSTRALASIA, &c., &c. (London: Trübner & Co.)

THE author of these pages has spent a good portion of his life in travel, and these "Rough Notes" deal with certainly not the least interesting of his experiences. It is just on this account that we cannot help regretting that a little more editorial labour has not been bestowed on them before publication. The routes described include many of the principal terrestrial and ocean highways, the experienced attention of the author notes most objects worthy of observation, and his style though familiar is entertaining, but these good points are really to a certain extent neutralized by avoidable blunders such as statements that Agra is in the Central Provinces and Malacca is in India, and more especially by the continual repetitions which have been allowed to stand. The descriptions for instance on pp. 479, 480 and 481 of the Kootub Minar and the Iron Pillar at Delhi are nearly word for word the same as those to be found on pp. 27 and 28, while the numerous similar instances which we have noticed must have contributed sensibly to swell the volume to its present bulk, that of over 600 pages; these repetitions, too, are occasionally embarrassing as in the case of two different statements respecting the population of Aden, which in one place appears as 20,000, and in others as 30,000. According to the last census, that of 1872, the population was 19,289. We must also remark that the difficulties of cutting a canal through the Paumben Pass between India and Ceylon, a problem which has exercised the best attention of men like Sir Arthur Cotton, Captain Taylor, Mr. Robertson, Sir James Elphinstone and others are, much too glibly annihilated by the author (p. 569), while his excessively severe strictures on the normal behaviour of Anglo-Indians to natives are certainly unmerited, though we do not of course deny that occasional instances of unworthy treatment of natives may have come under his observation.

Having said thus much, we must express our pleasure at the amount of interest which a perusal of the work cannot but excite. The part relating to the journey from Peking across the desert of Gobi to Kiakhta, and thence across Siberia to Perm is especially worthy of attention. The author's companion, Mr. Grant, was consulted by the Lamas of Urga, on the occasion of their preparing for their journey into Tibet, to search for the child into whose body the soul of the Lama King or Kutuchtu had found its way, as to the best mode of proceeding. The author takes occasion to dwell upon the subject, and he may therefore be interested to learn that the young Kutuchtu was duly found, and after an adventurous journey from Lhasa entered Urga on the 30th of October last. An account of the mission will be found in our March number, p. 87.

We must refrain from entering at any length into the author's narrated experiences. Suffice it to say that he has furnished us with a book of travel somewhat above

the average, and when he deviates (as he not unfrequently does) from well-trodden paths, he often affords us instructive and entertaining reading.

—:o:—
TRAVELS IN ASIATIC TURKEY.*

HERR JULIUS SEIFF, a civil engineer of Dresden, paid a seven months' visit to the East in 1871-2. Having made a trip through Cyprus, he landed at Beirut, travelled thence to Damascus, Baalbek, and Homs; paid a flying visit to Palmyra; then proceeded by way of Hamah, and the ruins of Apamea to Aleppo, Antioch, and Alexandrette, where he embarked for Smyrna. From the latter place he made an excursion into Anatolia. Herr Seiff's tour did not, therefore, extend into regions not previously described by Europeans, nor does he claim to be ranked as a scientific traveller. His volume is eminently the work of an intelligent and entertaining tourist, and he interweaves with his narrative the results of an instructive reading, so as to present his readers with an instructive account of the scenes visited. His book will prove particularly interesting to those who are themselves about to undertake a similar tour to the East.

HERR MARNO'S JOURNEY UP THE NILE.

HERR MARNO, the Austro-Hungarian *savant* attached to Gordon's Nile Expedition, arrived at Ladó, Gordon's head-quarters, on the 31st of December last. According to two letters addressed to Professor von Hochstetter and Hofrath von Becker, he appears to have had a rapid journey up the Bahr-el-Jebel, owing to the waters being very near their height. Herr Marno was well received at Ghaba Shambil (about 7° N. latitude), on the Bahr-el-Jebel, by Hassan Ibrahim, a former friend of Poncet's, and invited by him to make an excursion into the country of the Dyr and Niam-niam, as far as the home of the dwarf nation called Akkas, a young female of whom he brought for Herr Marno to see. Some male representatives of this curious race reached Italy under the custody of the late Signor Miani, but no females have ever been seen previously, not even by Schweinfurth. Ladó has been made a station by Colonel Gordon, owing to the unhealthiness of Gondokoro. This latter place stood on an eminence from 20 to 25 feet above the river which flowed at its foot. Owing to its having shifted its course westward, the remains of the river has become a stagnant and fever-breeding marsh. Marno proposes to explore to the west and east of Lake Albert, as he does not consider it beyond probability that the lake may have another outlet either at its south-west or north-west angle, while the information obtained by Colonel Long respecting the Victoria Nyanza differs so materially from that of Grant and Speke that an examination of it is also very desirable. Herr Marno concludes by remarking that since Gordon's arrival a much better understanding has prevailed between the natives and the Khedive's officers, and that they now clearly see that the latter mean well by them, and wish to buy or exchange goods with them, instead of robbing them as the slave traders habitually do.

ERRATUM.

In the May number—Notice of Humboldt's *Natur-und Reisebilder*.

Page 148—1st column, for Trübner and Co., as publishers of the work, read F. Norgate.

* *Reisen in der Asiatischen Türkei*, von Julius Seiff. 8vo. pp. 534. Leipzig, 1875. (London: Trübner & Co.)

Cartography.

—:o:—
Stanford's Polar Map.

STANFORD'S map of the countries round the North Pole extends to latitude 50° N., is neatly engraved, tastefully coloured, and embodies the results of the latest surveys and explorations. In this latter respect it certainly is superior to the "Chart of the North Polar Sea," a revised edition of which was published in October last by the Admiralty, as witness the eastern extremity of Novaya Zemlya and the northern coast of Asia. Exception may, however, be taken to the mode of spelling adopted occasionally, in which respect the author has been misled, in several instances, by the Admiralty chart. The island between Novaya Zemlya and the mainland should be called Waygat (Waijgat) Island, and not Waigatz or Vaigat, for the name is Dutch and means "Blow gap," from the strong winds prevailing there. "Liaghoff" and "Liakhov" of the map both represent the name of the same individual, the latter being the more correct rendering. We think, too, that the adjective termination of Russian proper names should be discarded, though in this respect the author only follows the lead of many eminent predecessors. Fadeyef Island, for instance, strikes us as being more consistent than Fadeyevskoy Island. In the name of Cape Chelyuskin, this principle has been adhered to, for otherwise that cape would have been called "C. Chelyuskinskoy." These, however, are not questions of great importance, and do not affect the general correctness and utility of this map. Far more serious are our objections to the selection and arrangement of "the names of the chief Arctic worthies and the dates of discovery," which are marked in red. We should have liked to see the coasts coloured according to the nationality of their discoverers, or with reference to the date of discovery, or by a system combining both. The names now scattered over the map certainly point out the scenes of operations of a large number of Arctic explorers, but they fail to illustrate in an adequate manner, the history of discovery. Take Novaya Zemlya as an instance. We find attached to that island the names of Borough (it should be Burrough), 1556; Barents, 1594 and 1597; Hudson, 1608; Vlamingh, 1664; Carlsen, 1863; Johannesen and Mack, 1871. We miss the names of Willoughby, the first European who sighted the island in 1553; of Loshkin, who circumnavigated the whole of it, in 1760-62; of Rosmiuslof, who was the first to penetrate through Matochkin Shar, in 1769; of Pakhtusof, to whom we are indebted for our knowledge of the eastern coast up to latitude 75°, and of several other explorers of more recent times. Similar omissions occur in other parts of the map, and as this is a matter which can easily be set right in a future edition, we hope Mr. Stanford will provide us with a trustworthy historical map, illustrating the progress of Arctic discovery, when that opportunity offers.

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Maps of India.

THE new maps issued by the Indian Survey Departments since our last notice are no doubt valuable contributions to the Topography of India, but do not offer any novel feature calling for special notice.

Beginning, as usual, with the Topographical and Revenue Surveys, published on a scale of 1 inch to the mile, we have to notice the publication of a sheet of the map of Bhaugulpoor, surveyed by Captain Sherwill, as far back as 1846-9, and hardly of much interest as the results of the survey had been previously published on a smaller and more convenient scale.* The first nine sheets of a revenue map of the district of Dehra Ghazi Khan have been

* Lower Provinces Revenue Survey: District Bhaugulpoor. Scale 1 m. = 1 in. Sheets 12, 13, 14. Calcutta, 1874.

issued.* They are based upon surveys carried on in 1870-72, under the direction of Colonel J. E. Gastrell, by Captain W. Barrow, and are to be commended on account of the adoption of the modern system of spelling. The level series, carried in different directions across the country, are printed in red. The topographical map of Gwalior and Central India† has been increased to the extent of four sheets, from surveys made in 1872-73, by Lieutenant T. H. Holdich, and 64 out of a total of 101 sheets have now been published. The topographical map of the Central Provinces and Vizagapatam,‡ has had two sheets added to it from surveys by Colonel G. H. Saxton, made in 1871-2, and the revenue map of Chanda§ has been completed by the publication of the two sheets mentioned below, for which we are indebted to Captain F. Coddington's labours in 1868-70.

Amongst maps on a smaller scale than that of Western Bengal|| claims our attention first. The sheet now published comprises the Nepal boundary districts between longitude 84° 30' and 88° E., and contains hardly more information than Major Montgomerie's frontier map noticed previously. The compiler of this map has not availed himself of this splendid opportunity of presenting us with a characteristic sketch of a portion of the Himalayan system, and in the spelling of the names he is as inconsistent as are, unfortunately, most Indian map makers. The map of Kooch Behar¶ is a mere skeleton, showing the civil and criminal jurisdictions. Of far higher value is the degree sheet of the Kattywar Survey,** published under the superintendence of Colonel J. T. Walker, of the Trigonometrical Survey. It comprises the country between latitude 21° and 22° and longitude 71° and 72°, is carefully drawn, distinguishes between metalled and country roads, shows the political boundaries, and the altitudes, as far as ascertained, as well as soundings, and follows a carefully devised system of orthography. On this map, as on nearly all others published in India, the old value for Madras Observatory is retained. This must inevitably lead to confusion, especially when there is nothing on the face of the map to indicate this fact. At all events, the example set by Colonel Walker, who gives *both* longitudes, should be followed on every single sheet of the Indian surveys published.

Of plans on a large scale those of Chinsurah Derah Ghazi Khan and Kurnal have been issued ††

Kiepert's Handy Map of Palestine.††

THIS map may be described as a miniature edition of Kiepert's Wall-Map of Palestine, noticed in the *Geographical Magazine* for February last. It contains nearly the whole of the information of the larger map, is coloured in the same manner, and sold at the remarkably small price of 60 Pfennig or 7½d.

* Punjab Revenue Survey: District Dehra Ghazi Khan. Scale 1 m. = 1 in. Sheets 11 to 19. Calcutta, 1874.

† Gwalior and Central India Topographical Survey. Scale 1 m. = 1 in. Sheets 54, 55, 56, 58, and 59. Calcutta, 1874.

‡ Central Provinces, and Vizagapatam Topographical Survey. Scale 1 m. = 1 in. Sheets 22 and 23. (New Series). Calcutta, 1873.

§ Revenue Survey: Chanda District. Scale 1 m. = 1 in. Sheet 7. Calcutta, 1874.

|| Map of Western Bengal. Scale 8 m. = 1 in. Sheet 11. Calcutta, 1874.

¶ Skeleton Map of the Kooch Behar Division. Scale 8 m. = 1 in. Calcutta, 1874.

** Degree sheet, No. VI. of the Kattywar Survey. Scale 4 m. = 1 in.

†† Chinsurah Cantonment and Environs. 16 in. = 1 m. Calcutta, 1874.

Plan of Derah Ghazi Khan. Scale 12 in. = 1 m. Calcutta, 1874. Kurnal, City, Civil Station, Old Cantonment, and Environs. 2 sheets. Scale 6 in. = 1 m. Calcutta, 1874.

‡‡ Neue Handkarte von Palaestina. Von H. Kiepert. Scale, 1:800,000. Berlin, 1875.

Log Book.

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The Duke of Edinburgh.—H.R.H. The Duke of Edinburgh has accepted the post of Honorary President of the Royal Geographical Society, which will enable him to preside at meetings of a Society in the objects of which His Royal Highness takes a special interest.

German Arctic Prospects.—A deputation from the Bremen North Pole Society visited Portsmouth last week with a view to consulting Captain Nares regarding co-operation between the English Arctic Expedition and a German Expedition which may possibly be sent out next year. It consisted of Dr. Lindeman, the Secretary of the Society, Dr. Copeland, Dr. Börgen, Mr. Sengstacke, and Mr. Guthese. Dr. Copeland was astronomer on board the 'Germania,' and Mr. Sengstacke was the chief officer of that vessel during the expedition on the East Coast of Africa.

The Port of Callao.—Callao, the port of the capital of Peru, has undergone an extraordinary transformation of late years. Until recently there was an inconvenient and an antiquated pier enclosing a small boat harbour, and no other facilities for commerce. In 1869 a concession to construct new works was granted to Messrs. Templeman, Bergmann & Co., who made a contract in England, and in August 1870, Mr. James Hodges arrived at Callao, representing the contractors. It was discovered, on taking borings, where the foundations of a new sea wall were to be, that, instead of being on gravel, they would be on mud and soft clay about 20 feet deep, through which, at certain periods of the year, strong springs of water force themselves, highly charged with sulphurated hydrogen gas.

It is to this phenomenon that *Callao painter*, well known to first lieutenants on the Pacific Station, is due. These discoveries led to a revision of the whole scheme; which was entrusted to Mr. Edwin Clark in England. The works have now been carried out in accordance with the new plans thus drawn up. It was necessary to excavate the bed of Callao Bay to a depth of 16 feet, and to a width of 140 feet, upon the site of the sea walls. This space was then filled up with rubble stone and gravel up to within 26 feet of low-water mark, thus forming an artificial foundation upon which the concrete blocks, forming the dock walls, were built. The total length of these walls is 4520 feet, and they enclose a space of nearly 52 acres, with berthing accommodation for thirty large vessels. In addition to the dock, a long sea wall has been built, which reclaimed from the shallow water of the bay a space equal to about 13 acres. This reclamation space has been drained, and bonded warehouses will be erected upon it. The works were completed on February 11th, 1875, having been commenced in 1871. There are eighteen steam cranes on the works for loading and unloading goods, a triple line of railway along the whole length of the dock wall, a lighthouse, capstans, an illuminated clock tower, ninety-seven gas lamps, and a supply of fresh water at eight points for the use of shipping. The

total expense of these splendid works to the Peruvian Government has been 40,000,000 francs. Mr. Hodges superintended the execution of the work throughout, and was entertained at a grand dinner before his departure for England on the 17th of last March.

An Unpublished Map of Mexico.—Baron von Rosencranz, an Austrian officer who accompanied Maximilian to Mexico, has constructed a map of the country between Guadalajara and Vera Cruz, Tampico and Oajaca, which is based to a large extent upon original surveys. We are informed by a competent judge that this is an exceedingly fine specimen of map drawing, and of the highest value. The author has offered it to the Mexican Government, without being able to elicit a decisive reply, and his offers to sell it at Vienna and Berlin for 300*l.* have been equally unsuccessful. Our correspondent expresses a hope that so valuable a work will not be allowed to remain unpublished, and thinks a purchaser might be found in England.

The Mean Height of Europe.—Since the publication of Humboldt's estimate of the mean height of the continents above the level of the sea, our knowledge of altitudes has increased immensely. Dr. G. Leitpoldt, availing himself of the latest surveys and measurements, has lately calculated the mean height of Europe. His methods of calculation and the results obtained are set forth at length in an interesting pamphlet (*Ueber die mittlere Höhe Europa's*) published at Plauen. We confine ourselves to a notice of the principal results. These are as follows:—

Mean Height. feet.	Mean Height. feet.
1. Switzerland 4264	8. Rumania 826
2. Spain and Portugal 2298	9. British Islands 714
3. Balkan Peninsula 1902	10. German Empire 701
4. Austria 1698	11. Russia 548
5. Italy 1696	12. Belgium 536
6. Scandinavia 1404	13. Denmark 115
7. France 1292	14. Netherlands 31
Mean for Europe : 974 feet.	

These results, certainly, are not yet final, but may confidently be looked upon as an approximation to the truth.

The Resources of Bulgaria.—In the *Monatschrift für den Orient*, issued from the Oriental Museum at Vienna, Herr F. Kanitz draws a most disheartening picture of the industrial and commercial condition of Bulgaria. The majority of the Bulgarians in the large towns along the Danube are traders. Priests and monks abound amongst them, but schoolmasters, doctors, and lawyers are scarce. Those on the plateaux and in the Balkan devote themselves to cattle-breeding and industrial pursuits, and the inhabitants of the fertile plains confine themselves almost exclusively to agriculture. A large portion of the fertile soil is as yet uncultivated, and until a better system of administration shall have been introduced and roads made, there is little prospect of improvement. The Maritza River, which flows through the fertile plains of Adrianople and Philipopol is navigable only for rafts, and its harbour, Enos, is allowed to become silted up with sand. The railway from Adrianople will hardly improve matters, for it is proposed to levy an export duty upon grain at Enos, and

no roads connect the railway with the interior of the country. Maize is the principal breadstuff grown. The wheat of Eski-Sagra enjoys a high reputation. The cultivation of rice has been introduced from Egypt. Tobacco is grown on the Vardar and in other suitable localities. The cultivation of the vine has decreased of late, owing to the exorbitant taxes levied upon its cultivators. The manufacture of attar of roses constitutes a source of wealth to some districts on the southern slopes of the Balkan, which supply likewise walnuts to the value of 30,000*l.* a year. Crape-seed, flax, cotton, beans, onions (which are eaten in lieu of potatoes) are likewise cultivated. The Balkan is covered to its highest summits with dense forests of oaks and beeches (conifers are comparatively rare). Along its slopes there are plantations of walnut-trees, mulberries, plums (from which the favourite spirit, Raki, is distilled) and other fruit trees. The mild climate favours the breeding of silkworms. The breeding of horses, buffaloes, oxen, sheep, goats and poultry is of considerable importance, Minerals abound, but the iron-works of Samokofare are still carried on in the most primitive manner, and although there is plenty of coal and water-power, and the Bulgarian possesses an extraordinary skill in all kinds of manual work, there are hardly any manufacturing establishments. This is not to be wondered at if we bear in mind the miserable government of the Turks.

Journey in Nepal and Tibet.—Last year a native explorer was despatched by Colonel Walker to explore a portion of Nepal. He started from Pitoragarh in Kumaon and crossed the river Kali by means of a sling attached to a rope, having no nerve for the usual method of crossing, which consists of suspending one's self by one's hands and feet, bearing such loads as are to be borne on the chest. From this point he bore eastwards towards the town of Jumla. Slavery exists here and throughout Nepal, all castes being sold into slavery, a father having power even to sell his children, but it is reported that Jung Bahadur has intentions of suppressing this practice. At Bhajangaya and Bajru there are forts, and at the latter place a good deal of excitement was prevalent owing to the increased contingents of troops which, under Jung Bahadur's orders, each town has now to supply. The Kalakhata ridge which was passed about half way between the Parnali River and Jumla, reaches the height of 14,528 feet. Thence the ground slopes down to Chaugan or Jumla, which is rather more than 8000 feet in height. There are 300 sepoyes here, besides stores of guns, ammunition and provisions within an inclosing mud wall of about 2000 feet in periphery. Here the explorer got a pass, and proceeded on in a south-east direction till he reached the Gheri River, when he followed the course of that river northward. At one place this river has high, perpendicular, rocky banks, and the natives have made a tunnel 54 paces in length through the rock. There was originally a crevice, and the rock on either hand was cut away so as to admit of a man with a load to pass through with a squeezing, the height of the tunnel not being sufficient in all parts of his going through standing. From Charka there is a direct road running north-east to Labrang-Koja on the Brahmaputra, and laden sheep, goats and horses are taken along it. At Muktinath,

which lies south-east of Charka, and is 11,284 feet above the sea, there is a holy spring of a sulphurous character, which enters a cistern from whence it flows out through 108 spouts, under each of which every devotee passes, and encircles the temple. A little distance to the south there is a crevice at the water's edge with a flame in it, which is constantly burning save when a rise in the waters takes place, when after a temporary disappearance, there is a report and the flames burst out again. Loh-Mantang is situated about 11,900 feet above the sea-level, and enclosed by a wall about 6 feet thick and 14 feet high. It is the resort of numbers of traders from Tibet and Nepal, who either exchange their goods here or take them to dispose of at Lhasa or Nepal. These traders are called Thaklis; they are of mixed origin and have the privilege of going to Lhasa and even to Calcutta for the purchase of goods. The Raja collects an annual revenue from all sources of about 10,000 or 12,000 rupees, out of which he pays 2000 or 3000 yearly to Nepal from the land revenue, and 10 per cent. of the taxes levied on goods brought across the northern frontier to the Lhasa Government. The pass between Nepal and Tibet, by which the explorer crossed, is called Photu Lá. It is 15,080 feet above the sea. The Brahmaputra was reached about 84° E. longitude, where it is about 250 feet wide and has a very gentle current, and crossed by means of yak's hides sewn at the ends, and attached to sticks at the sides which are propelled by two or four oars. At Tadum, north of the Brahmaputra, the explorer was turned back by the "Gopa," or headman, although he protested that he was a physician on his way to Lhasa, and showed his passes. He was thus compelled to return, and succeeded eventually in reaching British territory, after following the course of the Gandak River. The entire route affords us valuable topographical information respecting the little-known kingdom of Nepal.

Obituary.—A. G. FINDLAY, F.R.G.S. Born in 1812, Mr. Findlay had just attained his sixty-fourth year at the time of his death, which occurred at Dover, on the 3rd ult.; the sad event being accelerated, after several years of failing health, by the death of his wife, whom he survived but seven weeks. In 1844 he became a Fellow of the Royal Geographical Society, and was for many years a member of its council. His father, Mr. Alexander Findlay, was one of the earliest supporters of the Society on its establishment in 1830. Mr. Findlay's earlier years were occupied in the compilation of hydrographic maps, charts, and atlases, which are well known and appreciated. But it is to his Nautical Directories chiefly that he owed his fame, which are monuments of industry and perseverance; the first of them, the *Directory for the Coasts and Islands of the Pacific Ocean*, appearing in 1851. In 1858, at the death of Mr. Laurie, the well-known cartographic publisher, who had previously been the medium of making public Mr. Findlay's works, he took over the business, and was the means of resuscitating one of the oldest of its kind in Europe. By so doing he was enabled to carry out his designs, viz., the completion of his series of nautical directories for the whole world, and which are accepted as standard authorities in every portion of the globe frequented by the Royal and Mercantile Navies. Mr. Findlay was a contributor to the *Journal* of the Royal Geographical

Society, and devoted much time to the labours of Dr. Livingstone. In Arctic matters he took a deep interest, and was a member of the Arctic Committee, and but for his infirmity would doubtless have continued his labours in the cause. Through the death of this eminent geographer, the scientific world has sustained a severe loss.

A New Italian Geographical Society.—We learn with pleasure that Turin has started a Geographical Society, an unmistakable proof of the widespread interest in geographical science which is everywhere developing. It is a good sign, too, that that energetic geographer Signor Cora has been elected President for the ensuing three years.

Correspondence.

EXPLORATION IN TIBET.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Your interesting review of exploration in Tibet in last month's *Geographical Magazine*, and the events which have recently taken place in Burmah, will, I hope, be the means of attracting the attention of the Indian Government to the subject of frontier explorations and politics. Is it not an extraordinary thing that at the present moment there is not one single route from Scinde all round the frontier to Burmah, by which an Englishman can pass out of India, except as a member of a government mission or at the risk of his life? Is it not incredible that along the whole Himalayan range from Kumaon to Sudiya, we know far less of the routes and passes into Tibet, many of which are within sight of British garrisons, than of the routes to Lake Tanganyika? Is it not marvellous that though hundreds of officers are travelling annually all over the North-west Himalayas and Kashmir, hardly any have explored the far more interesting countries to the eastward, so great are the obstacles placed in their way both by the British and native governments and the chiefs who inhabit these hills?

Certainly there is no more rich and interesting field for travel in the world than the Eastern Himalayas, and though the hardships and discomforts to be endured are undoubtedly great; the discoveries, whether geographical, zoological, or botanical, which might be made there, ought to compensate for all the drawbacks. It surely would be well for our Government, who may be at any moment embroiled with the various semi-civilized or savage tribes of the Eastern Himalayas; to gain that knowledge of their country and character which might often avail to prevent war, or at least to make the suppression of these frontier outbreaks much easier and less costly.

Though the Nepalese have for the last forty years treated us on the same sort of footing with respect to right of way, as they would treat a deadly and treacherous enemy, and our Government has quietly submitted both to this, and to the absolute refusal of the Chinese Government to carry out the provisions of our treaty, by allowing a right of way through Tibet to China: this cannot go on for ever, and I feel sure that a different policy must some day be introduced.

As for trade, I think the importance of trans-Himalayan trade has been much exaggerated, but if there is any one product which it ought to pay to export; it is tea. It is the most important article of consumption to the whole population of Tibet, and the distance from the Darjiling plantations to the Tibetan frontier

does not exceed eight or ten marches by the present execrable route.

I have not been able to get Mr. Edgar's report on the results of his journey in 1874, but judging from what I saw when I visited the Sikkim passes, in company with Mr. Blanford, in 1870, there would be no serious difficulty in making a pony-road from the plains to the Jelep-lah, which does not exceed about 14,000 feet elevation.

If Darjiling is chosen as the starting point, a formidable obstacle is presented by the Teesta, but beyond that there are no rivers of importance to cross, and only two that would even require bridges. The distance from the Jelep-lah to Pari is not above two or three days' journey, and from there the route to Lhasa is without any serious impediment, and will compare most favourably both in distance, elevation, and facility with any of the roads to Yarkand. The other passes which I visited, namely, the Cho-lah, Tunkra-lah, Donkia-lah, and the one called Kongralama, are not only all much higher than the Jelep-lah, but much more distant from the plains, and as every day gained on this side of the passes is equal to two or three on the other, the nearest pass is the best. Now that the Eastern Bengal Railway is being extended to Jelpigoree, a road might be made from that place *via* Daling-fort, the Jelep-lah, and Pári, by which one might go from Calcutta to Lhasa in a month or less, and this, I believe, could be done at a trifling expense.

The reason why the Tibetans do not buy our tea now is, has I was told by a Tibetan governor himself, because the import of tea from India is strictly forbidden. That they would buy it there can be no doubt, and if the planters would take a little trouble to make it up into bricks, I believe they might dispose of all their inferior qualities, at a price much higher than they can get in Calcutta. Quantity not quality is the great point with the majority of Tibetans, and an excellent broken tea is sold at Darjiling for 4 annas per pound (tea far superior in flavour and strength to what is drunk by the labouring classes in England at 2s. 6d.). I cannot doubt that a large trade would spring up as soon as the harassing restrictions and oppression now kept up by the frontier officials were removed. Whether the road from Assam to Tibet by Sudiya is a practicable trade-route seems doubtful, but judging from the accounts of Captain Wilcox and Mr. Cooper it is an extremely difficult one at present, and the people are far more savage than those of Sikkim. My valued friend Colonel Haughton, late Commissioner of Cooch Behar, who with Major Godwin Austin knows the north-east frontier and its inhabitants as well as any one, was, and I believe is still, of opinion, that if the Government really wished it, the route to Lhasa might and should be opened, and would be quite as well worth opening as the route to Yarkand.

Hoping that matters will not much longer remain in their present unsatisfactory position, I remain, Sir, yours, &c.

H. J. ELWES.

Miserdine House,
CIRENCESTER.

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DISCOVERY OF THE ISLANDS OF ST. PAUL AND NEW AMSTERDAM.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Will you allow me to correct an error which appeared in your interesting review, for February last. In an article on "Amsterdam Island," page 48, I read: "Until this year it was believed that the Dutch navigator Vlaming discovered Amsterdam Island in 1696. But this year Lord Stanley of Alderley, in his

First Voyage round the World by Magellan, edited by the Hakluyt Society, has fully established the fact that the Island of Amsterdam was discovered on March 18th, 1522, by the 'Victoria,' the first ship which ever sailed round the world," &c.

Now in the first place, the Dutch navigator Willem de Vlaming has never laid claim to the *discovery* of the island of New Amsterdam. He has visited and described the two islands, St. Paul and New Amsterdam; but, judging from his journal, he silently supposes both of them to be discovered before.

Lord Stanley of Alderley may have been the first *Englishman* who has established the fact that the northern island was discovered by D'Elcano in 1522, but this fact was not unknown to Dutch and German writers. You may find it mentioned, for instance, in the excellent work of Oscar Peschel, *Geschichte des Leitalters der Entdeckungen* (1858), page 643. And, indeed, after the publication of Albo's logbook by Navarrete, it was evident that the island mentioned by him could be no other than that of New Amsterdam.

But who has discovered the island that we now call St. Paul, and who has given to both islands their name?

As to St. Paul, no Dutch navigator would have given the name of a saint to any new discovery of his; and, moreover, it is spelt in the old Dutch documents *S. Paulo*, a form they must have borrowed from the Portuguese. Now, which of the two islands bore this name? Some light on this matter is spread by an interesting article written by Captain P. A. Leupe, of our State Paper Office, (*Ryks-frihief*), and published in the Dutch *Nautical Magazine* for 1866.* We learn from it that before 1610 the Dutch ships going to India made their way around the island of Madagascar. In that year, however, they sailed for the first time from the Cape of Good Hope directly eastward to the meridian of 36°, and as they made in this manner a much shorter voyage, the Dutch fleets pursued from this time generally the same track. On this track they could not but find sooner or later the islands we speak of. And, indeed, from the documents collected by Captain Leupe, we learn that in 1617 both islands were seen by different ships; the southern island, to which was given the latitude of 38° 40' by the ship 'Zeewolf' (Seawolf), Skipper Havick Claesz; the northern island by the ship 'Tertolen,' Skipper Adriaen de Wale, who determined its latitude in 37° 40'. The names of both ships were given to the islands, but they did not last. In official documents of 1619 we still read "St. Paulo or Zeewolfs Island"; but on another occasion, in the same year, only St. Paulo. However, it is not always clear which of the two islands is indicated by this name, and the same uncertainty reigns in later documents till 1633.

In 1633 Antonio van Diemen, the same who, as Governor-General, sent Abel Tasman on his voyages of discovery, sailed to India, and saw, on June 17th, as we read in his journal,† to the south, the island of St. Paulo, and, shortly after, to the north, another island, "to which," says he, "we have given the name of New Amsterdam." He sailed between the two islands and determined their positions to be latitude 38° 35' and 37° 50'.

The journal of Van Diemen was not made public, otherwise the names of both islands would from this time have been fixed. But the contrary has been the case. Captain Leupe has found on old Dutch manuscript maps the islands called as by Van Diemen. On the printed maps, before De Vlaming, however, it is otherwise. On a map of Nicolas Visseher (Piscator) of 1652,

* *Verhandelingen en Berigten Cetreffende het Zeevezen*, &c., published by Jacob Swart, 1866, page 221 and *et seq.*

† An abstract of the journal regarding this discovery has been published by Mr. L. C. D. van Dyk in the Dutch journal, *Konst-en Letterbode*, for 1854 (pp. 158, 191), with a view of the two islands after the original drawing.

the first on which I find the two islands, the *northern* is called St. Paulo, the *southern* New Amsterdam. So, likewise, on the charts of the world, published by Johannes van Keulen before 1688 (in four sheets), and by Hugo Allardt about 1690 (in four sheets), and on the map of De l'Isle, "dressé sur les observations de Mess. de l'Académie des Sciences."

In 1701 the journal of William de Vlaming was published. We know that he retained the names as given by Van Diemen, and now they are also changed on the printed maps. The northern island bears from this time the name of New Amsterdam, the southern that of St. Paulo. So on the Dutch charts of Johannes Looz and others, on the maps of De l'Isle of 1720 and 1724, those of D'Anville, &c. Even on an English map by Herman Moll we find the same nomenclature.

From the foregoing facts it would appear that the Dutch navigators did from the beginning regard the southern island as that discovered before them by the Portuguese, and to which the latter had given the name of S. Paulo, and as they knew nothing of the discovery of D'Elcano, they imagined the northern island as discovered by themselves.

P. A. TIELE.

LEIDEN, May 8th, 1875.

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THE NORTH-WEST AFRICAN EXPEDITION.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Mr. Skertchly's communication on an expedition about to start for the purpose of exploring the Western Sahara cannot fail to interest geographers, though its results must certainly cause disappointment to its sanguine originators. Mr. Skertchly presumes that the greater part of this Western Sahara consists of a depression many feet below the level of the sea, which communicates with the Atlantic by means of a valley opening opposite the Canary Islands. He refers to Barth, Caillé, Panet, Riley, and other travellers in support of so startling an announcement, and tells us that Mr. Brion has prepared a relief model (of "plastic" clay, I presume), by which it can be seen at once that El Juff is a natural depression, into which the Atlantic waters would at once flow if the sand-bars at the mouth of the "Belta" (Wadi Dra'a) were cut through. I do not for a moment doubt the possibility of El Juff sinking below the level of the sea. A depression of this kind is already known to exist to the south of Algeria, which it has been proposed to fill with water from the Mediterranean, at an estimated expense of 3,000,000*l.* The oasis of Jupiter Ammon offers another example of the same kind; but before a similar assertion can be made with respect to El Juff, or any other portion of the Western Sahara, it will be necessary to observe a few altitudes. Neither of the travellers named has done this, nor do their works, as I read them, justify Mr. Skertchly's sweeping assertion. That, which he appears to include in his future inland sea, lies actually at an elevation of 340 feet above the sea, and in order to reach El Juff, either from Tuat or from the Wadi Dra'a, it is necessary to cross a broad belt of hills, probably a freshwater formation of pliocene age, as in the case of a similar belt to the south of Algeria.

The prospects of an extensive commerce held out by Mr. Skertchly are equally delusive. The "enormous mineral" wealth of Taflet and Tuat is limited to a little saltpetre and alum, whilst Bambara and Hausa are as readily accessible now by means of the Senegal or Niger as they will be when the proposed inland sea shall have been formed.

R. F.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 26th of April, 1875.

TIBET.

THE PRESIDENT, SIR HENRY RAWLINSON, took the chair at 8.30 P.M. The paper read was "Travels in Great Tibet and Trade between Tibet and Bengal," by Clements R. Markham, C.B., which appeared *in extenso* in our last number (see page 129). In the discussion which followed the reading of the paper—

Colonel T. G. MONTGOMERIE said that for some time the officers of the Trigonometrical Survey in India were employed in the north surveying the frontier, and naturally the great regions beyond attracted their attention; but the Government of India were anxious that nothing should be done to endanger those connected with the Survey. The officers, however, endeavoured to acquire as much knowledge as possible of the countries beyond the mountains, and it became known to him personally that the longitude of Yarkand was not what it had been represented by Humboldt, and in the great surveys connected with China. Consequently, when the survey on the frontiers approached completion, arrangements were made for carrying on explorations beyond. One man was sent to Yarkand. He made a route survey, and succeeded in fixing the position of that place. His figures had since been tested by European explorers and skilled observers, and were found to be correct. The next step was carried out by Mr. Johnson, who was employed on a survey close up to the frontier at various heights, from 15,000 feet to 22,000 feet above the sea. He crossed the Kuen Lun range, and was the first European who had succeeded in passing from the plains of the Punjab to the basin of Eastern Turkistan. He found the Himalayas to be 400 miles in width at apparently their narrowest part. It was then found impossible to employ Europeans to make the explorations that were desired, and a number of natives were therefore trained to do the work. When he (Colonel Montgomerie) required some one to make a journey into Tibet, he selected a man who was either a semi-Tibetan, or had friends who were in the habit of travelling in that difficult country. Such a man was regularly trained to observe the stars and to make route surveys, and he was then sent out upon a trial trip over ground of which the maps had not been published, but existed in manuscript, so that his work could be tested. After several such trials, if his results were correct, he was sent into unknown territory, starting from one known point and closing upon another known point. If he performed that journey satisfactorily he was given charge of a longer expedition. The chief Pundit, who had been referred to in the paper, carried a route survey down the whole length of the Tsanpu River. Up to the year 1863 the upper waters of many of the large rivers of India were still unknown. A considerable portion of the Indus was unknown. Neither was it known how the Brahmaputra or the Kosi ran. A great deal had since been done, but much still remained undone. The upper course of the Indus was now known, but a portion, about 180 miles had not yet been traced. Still greater ignorance prevailed about the last 350 miles of the Brahmaputra, for it was not certainly known whether the Tsanpu was really the Brahmaputra or not. Although the head waters rose almost in British territory, and the river flowed through British territory, there was still an unknown portion of about 350 miles. Explorations had now been carried on throughout every part of the frontier of India, from Kelat to Kabul, then across the Hindu Kush, down to Faizabad, up the Oxus, across the Pamir Steppe to Kashgar, from Kashgar to Yarkand, round to

Rudok, and down to Lhasa. Only a few days ago he heard of the return of the chief Pundit, who had been lately in Eastern Turkistan. He had crossed over from Ladak by a northerly route, passed through a succession of gold-fields, came down upon the Brahmaputra at Shigatze, travelled down the river for some distance, and came out in Assam, passing through Towang. Now that the Geographical Society threatened to make an end of Africa, and the Arctic regions were likely to be thoroughly explored before long, there was nothing left for them but the happy hunting-ground to the north of India. If any enterprising gentleman wished for a trip in a Rob Roy canoe, he might put himself on the Brahmaputra, near the Mansarowar Lake, and pass down through the length of Middle Tibet. He would thus have an opportunity of exploring the unknown 350 miles. The large district extending from Lhasa to Kashgar, and from Kashgar across the desert of Gobi, right away to China, was still an unknown land, and offered a large field for future geographical enterprise.

The PRESIDENT reminded the meeting that geographers were very much indebted to Colonel Montgomerie for having originated the institution of native explorers, which was one of the most valuable agencies for the acquisition of geographical knowledge that had ever been established in India. With reference to the suggestion that some one should descend from Lhasa to Sudiya in a Rob Roy canoe, it must be remembered that in a short space of 300 miles the river falls 10,000 feet. No doubt there were some tremendous rapids and cataracts in that interval, so that it was by no means certain that a canoe would reach Sudiya in safety. He, however, echoed Colonel Montgomerie's hope that the routes would be explored. But there were other questions than those of mere geography connected with this subject of Tibet, such as that of the trade railways between India and the countries conterminous with it on the north-east; and the Society was fortunate in having present two ex-governors of Bengal, Sir George Campbell and Sir Cecil Beadon, who had carefully studied the question of trade routes.

SIR GEORGE CAMPBELL said, although Mr. Markham had not travelled in Tibet, his enquiries at home had been as effectual as the work of many travellers. It was a remarkable instance of what might be done by energy and zeal, for he had succeeded in unearthing narratives of travel which had remained unknown for nearly a hundred years. Something was previously known of Captain Turner's journey to Tibet, but of Mr. Bogle's journey, all that we knew was that it had been made. It was supposed that the record of it had been entirely lost, but it now appeared that it had been kept, and would now be given to the world. At the same time Mr. Markham had obtained the history of a journey by another traveller, Manning, in 1812, of whose very existence most Asiatic geographers were absolutely ignorant. He thought hardly sufficient attention had been paid to the very minute and particular account of routes between Lhasa and China, which was furnished by the French missionaries, Huc and Gabet. It was sometimes the fashion to discredit their statements, because they were, no doubt, a little credulous about the stories that were told to them; but he had read not merely the short English abstract of their travels, but a much fuller French edition, and compared it with the information which had since been obtained, and the impression left upon his mind was that as regards the facts that came within their own observation, their accounts were most reliable in every way. They were not scientific men, but they gave correct descriptions of the routes they travelled from the north of China to Lhasa, and from Lhasa to Southern China. Considering the precise information which those missionaries afforded, and the results which had been obtained from the journeys of Colonel Montgomerie's natives, it might now be said that a very good knowledge was now possessed of the geography of the routes between India

and China by way of Tibet. He had taken great interest in the subject of trade between India and Tibet, and believed that the Tibetans themselves had really very little objection to trading with the English, the difficulties that were placed in the way arising solely from political considerations on the part of the Chinese. Englishmen knew something of protection and monopoly, and it, therefore, was not very unnatural that Chinese protectionists should insist on protecting their trade in tea. It had been said the want of enterprise on the part of British tea-growers was so great, that the Chinese tea was brought down for sale over the hills to the British dominions, but that was a mistake. In Bhutan, Sikkim, and Kashmere, brick-tea was still sold in small quantities, but that arose simply from the habits and customs of the people. For certain ceremonies brick-tea was regarded as necessary, and must be had, whatever price was paid for it. Assam tea had entirely superseded Chinese tea in all the countries to which it had access, but the Tibetans had placed an embargo upon it, and until that embargo was removed, Assam tea could not find its way across the hills. It appeared to him that however much was learnt of the Towang route, there could be little doubt that the route by way of Darjiling was clearly the best. A road might be made, as he hoped it would, into Sikkim, and so into the frontiers of the Chubi Valley, which was the outlying post of the Tibetans, running between Bhutan and Sikkim; but Europeans, and even Hindoo and Muhammadan merchants, were not allowed to enter by that route, being compelled to go round by way of Nepal. He could not greatly wonder at the exclusiveness of the Chinese and Tibetans, for they had got into trouble on many occasions when they had admitted Europeans into their country; but that repugnance must be overcome by great consideration being shown towards them, and by not attempting to back up every European adventurer, whoever he might be, who tried to penetrate into the country. Full and equal justice should be done to the inhabitants, so that when a man went among them and behaved in a manner that was creditable to the British nation, they might receive him without fearing that another who might be violent and unjust would be supported in his violence and injustice. The Tibetans and Bhutans were active and good traders, and the only difficulty in the way of facilitating intercourse was the political one. As long as the British in India were a distant power the Tibetans were not afraid, and permitted free intercourse to take place; but since so many states had been absorbed, and the British power had come close to them, they were naturally a little afraid, and pursued the policy of keeping the English at arm's length. They would not even carry on any correspondence with the English, and returned unopened any letters that were sent to them. When the softening influence of a just and considerate policy had reached the Tibetans, and diplomacy had produced an effect upon the Chinese, no doubt a very considerable trade would be established, and residents in India would be able to take pleasant and healthy trips beyond the Himalayas. Now that so many difficulties had been interposed in the way of communication with China in another direction, it was very important that every effort should be made to open the route between the eastern extremity of the Assam Valley and Batang upon the frontiers of China and Tibet. During his administration of Bengal he had occasion to draw a good deal closer than formerly the intercourse with the tribes occupying the hills, who had become much more amenable than they used to be. So far as those tribes were concerned, he believed there would be no real difficulty in establishing a communication with Batang. There again the only difficulty was the political one. If that could be overcome, the trade might easily follow the course of the Brahmaputra proper, and so reach the great province of Szechuen, and perhaps open a way for Chinese emigration into the tea-

districts of Assam, which were perhaps the best in the world.

Sir CECIL BEADON entirely concurred with Sir George Campbell in the praise he had given to Mr. Markham, for the extremely interesting paper which he had read. When he (Sir Cecil Beadon) was in Bengal, one or two attempts were made to explore the Brahmaputra, so far as it was practicable, by means of steamers and boats, and on one or two occasions considerable progress was made in going up that branch of the river called the Ding; but at no great distance above Sudiya it was found to be so exceedingly rapid, and the course so much contracted, that the steamers were unable to stem the current, and the attempt was given up. Between that point and the Towang route the countries bordering upon the valley of Assam were entirely in the possession of semi-savage tribes, with whom our relations are not of a very satisfactory nature, and through whose territories he was not aware that any pass had ever been explored by any European. Through the Towang Pass there was a considerable trade direct from Tibet, and that trade, he believed, had never been interrupted. It was not, however, open to Europeans, being entirely confined to the Tibetans and the Indian traders who went up the valley of Assam. By the treaty which was concluded with the Bhutanese after the campaign of 1864, a small portion of the Hill territory, was transferred from Bhutan to British India, and a military station was formed there. The natural route, however, was that to which Sir George Campbell had referred, up the valley of the Tista, below the Great Darjiling spur, to the pass which led into the valley of the Chumbi. That was the route which commerce had followed for ages, but Europeans were not allowed to penetrate into Tibet by that route. When he was in Bengal an attempt was made to carry a road up the valley of the Tista as far as the pass which separated Tibet from the newly-acquired territory of Bhutan, but very little progress was made. Whatever was done it was not probable that the trade between Bengal and Lhasa would ever assume very large dimensions, for the heights of the passes, probably not less than 18,000 feet, and the extremely steep ascent on the south side, would require a very large expenditure indeed to make the route practicable for anything but pack-animals. When he was at Darjiling an effort was made to establish a fair in the neighbourhood of the station, and some little traffic between the traders from the plains and from Tibet took place; but although apparently there was no objection on the part of the Tibetans to resort to the fair, the trade did not prosper.

Sir RUTHERFORD ALCOCK agreed entirely with Sir George Campbell as to the best route by which to communicate with Batang and China. No geographical difficulty was interposed by that route, and it was only political jealousy that prevented a considerable trade springing up in that direction between the plains of India and Szechuen. Wherever Europeans penetrated in the East trouble almost invariably followed, more especially in connection with China, which had already had three wars with England. It was not therefore to be wondered at that great difficulties should be placed in the way of our further advance. Patience and forbearance must be exercised, and no doubt in the end a communication would be established that would be beneficial to both places.

Mr. W. H. JOHNSON, the traveller who crossed the Kuen Lun into Khotan in 1866, was then introduced to the Meeting by the President. He thanked the President and Colonel Montgomerie for the honourable mention they had made of his services in connection with the great Trigonometrical Survey of India, and hoped that many explorers would ere long be found to visit the great country which Mr. Markham had so ably described.

The PRESIDENT said that for many years past Mr. Johnson had been Commissioner for the Maharajah of Kashmere in Ladak; and in fact, was the Governor of

that district. In that capacity he had rendered most important services to the British Government in facilitating the transit of Mr. Forsyth's mission, and later still Mr. Shaw's mission. His services had been very highly spoken of both by the officers concerned and by the Government. He was at present in England on leave, and was about to return to Ladak, where it was to be hoped he would continue his geographical labours, and occasionally send home such information as he was able to collect with regard to that very interesting country to the east of Ladak, where the gold-fields existed, but regarding which very little was at present known.

AWARD OF MEDALS.

In conclusion, the PRESIDENT announced that the Royal Gold Medals of the year had been awarded to Lieutenants Weyprecht and Julius Payer, for their explorations and discoveries in the Arctic Sea, between Spitzbergen and Novaya Zemlya. It was an unusual thing to give two medals for one expedition, but Weyprecht and Payer were *par nobile fratrum*, and it was impossible to dissociate one from the other, both being commanders, the one of the nautical, and the other of the land operations. He hoped that they would be able to be present at the Annual Meeting in person, but if they should be unable to attend no doubt the Austrian Ambassador would take charge of the medals in their name. The Public School Examinations had also been concluded, and Eton had again been victorious in both departments.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

AT the meeting of the 2nd (14th) April, M. P. Semenov, vice-president, being in the chair, the collection of Khivan jewellery destined for exhibition at the Paris Geographical Congress was open to view.

The SECRETARY announced that the Council had resolved to exchange publications with the provincial statistical committees, whose reports are most valuable authorities on the national resources, and nevertheless are seldom found in public libraries. The plan for a Siberian series of levels had been approved, and operations would start from Zverino Golovskaia, the easternmost point reached by the system of triangulation, in the direction of Irkutsk. Five parties will be employed under the direction of M. Moskof, who was engaged on the Aralo-Caspian Expedition, and M. Muller who has recently returned from the Olenek.

The SECRETARY also mentioned that the first number of the *Bulletin* for 1875 was ready for issue, and that an ethnographical map of Russia would be laid before the Society at its next meeting. He then furnished some intelligence respecting M. Sosnofsky, who is endeavouring to make his way from China to the Black Irtysh River in Siberia. This traveller, after experiencing great kindness from the Chinese authorities, finally left Hankow on the 11th of December. He hopes to reach without hindrance the province of Kansu, the Tungan insurrection being now quelled, and Chinese authority re-established in that part of the empire. He is however uncertain as to the route he will thence pursue, whether to go by way of Uliassutai, on to Barnaul or to Guchen and Bulun-togai. This news had been communicated to the Society by M. Veniukof, who also furnished some particulars respecting a newly-executed marine survey of the coast of Eastern Siberia, along a stretch of 450 versts from the Imperial Harbour to Plastun Bay. Some astronomical position and levels had also been determined in the same region, and the results sent to St. Petersburg by M. Bolshef. A survey of the mountainous district where the Chatkal(?) and Angren(?) rise had also been made by the military topographers of the Turkistan province, thus filling up a blank in the map of Central Asia.

After the Secretary had finished his report, M. Sievertsof gave an account of his explorations of the

Aralo-Caspian Steppes in 1874, and Baron Kaulbars exhibited a map of the Khivan oasis, giving, at the same time, a description of the agricultural system of the country as well as a short account of the density and distribution of the population in the delta of the Amu Daria.

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BERLIN GEOGRAPHICAL SOCIETY.

POPULATION OF CHINA.

BARON VON RICHTHOFEN has communicated some important remarks to the Berlin Geographical Society's *Proceedings* of the 2nd of January, on the subject of the population of China. Our readers may remember that that well-known Chinese traveller the Abbé Armand David had estimated the total population of the empire at three hundred millions, observing at the same time, that he could not at all understand Baron Von Richthofen's estimate of their numbers being as low as one hundred millions.* The Baron says that this representation of his views is erroneous, and that his experience has always tended to confirm the accuracy of the Chinese census. He observes that there are three ways of testing the correctness of their enumeration; firstly, by a consideration of the system adopted, secondly by the degree of probability attaching to the rate of increase brought to light, and lastly by testing the population of particular districts with those given by the census. The method of procedure in the census is as follows:—Tables are hung outside every house on which are inscribed the names of all its members, present and absent. By means of the overseers of a hundred houses, and a gradation of superior officials, the work would become simply one of addition, were no check introduced. This, however, is done every five years by certain officers who compare the statements of the *monn-pai*, or tables, with the actual number of inhabitants as seen by them. The avarice and venality of these officials, however, introduced elements of unreliableness, which either exaggerate or diminish the actual numbers according to what the object of the census may be.

Until 1711 the ostensible object of the census was the levying of a poll-tax, and the drafting off the inhabitants between the ages of sixteen and sixty, to forced labour, and a percentage of them to military service. That the officials did not neglect this opportunity for extortion is apparent from the fact that the office of census-taker was farmed out, and found ready bidders. Their direct interest being in making the numbers as low as possible, it cannot be wondered at, that the totals before the year mentioned in which the poll-tax was changed into a land tax, were low, fluctuating as they did between seven and a half to fifty or sixty millions, compared to those after. Even then the practice of drafting off the men for state labour still prevailed, and neutralized the good effect of the other change. But gradually the efforts of the rulers to obtain accuracy began to bear fruit, spite of the faulty system. Baron Von Richthofen considers the argument that the Chinese wished to vie in point of numbers with other States a fallacious one, as till lately they had no standard of comparison to look to, except their own previous censuses; secondly, because their other statistics show no such exaggeration; and thirdly, because the gradual increments are in a ratio founded on laws which even the Chinese could not have invented.

In 1749 the population was reckoned at 177 millions, but as it is clearly impossible that accepting the numbers for 1711 as twenty-eight millions, there could have been so tremendous an increase in the time, Baron Von Richthofen considers that we may assume that the depreciatory causes mentioned above were at work at the earlier period, and that adopting the same rate of increase as took place later, the real population of 1711 amounted to about 100 to 120 millions. In 1783 it rose to 284 millions; in 1812 to 362 millions; and

* See *Geographical Magazine* for August 1874, pp. 213.

Sacharoff arrived at the calculation, from an examination of the official archives, that the numbers for 1842 amounted to 415 millions. These estimates the Baron considers approximately correct. The rate of increase in the provinces corresponds fairly with that for the whole empire.

Taking all facts into consideration he inclines to the belief that the present population must amount to 420 millions. This calculation allows for the ravages of the Taeping rebellion and the Muhammadan insurrection, as there is no doubt that the total given for 1842 (415 millions) was considerably below the mark. It would be very interesting to ascertain the particulars of the censuses since 1842, as tending to throw light on the alleged decimation caused by the use of opium, and on questions connected with Chinese coolie emigration.

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TURIN GEOGRAPHICAL SOCIETY.

AT the meeting of the 11th of May, the felicitations of the Patron—the Prince of Savoy—Carignano to Signor Cora on his election were read, and several geographical announcements were made, among others that Dr. Nachtigall, who was in Rome, was about to read a paper on his recent explorations before the Italian Geographical Society. Signor Cora is also preparing a paper for the *Cosmos* on the same subject, accompanied by an original map. Captain R. F. Burton recently passed through Turin, on his way to England, and had informed Signor Cora that he was engaged in preparing a new work on the Congo, and that his work on Iceland was passing through the press. The Captain also mentioned that during his sojourn at Trieste he had made some important pre-historic researches and discoveries along the Adriatic Coast.

The PRESIDENT then stated that an Italian Expedition under the guidance of the Marquis Horace Antinori would shortly leave for Tunis. Military and naval officers, naturalists and photographers would be attached to it, the chief objects being the examination of some ancient Roman monuments in Northern Tunis, and a survey of the isthmus of Gabes so as to throw additional light on the possibility of creating an inland Sahara Sea. Other news were touched upon by the President, including the preparations of the English Arctic Expedition, in alluding to which Signor Cora paid a high compliment to the qualifications of Captains Nares and Markham. He made mention of a Dalmatian traveller, who shortly leaves for the East Indies, and who will be commissioned by the Society to devote his attention to certain geographical points of interest. The evening concluded with the election of the following gentlemen as honorary members, The Right Honourable Sir Bartle Frere, K.C.B., Major-General Sir H. C. Rawlinson, K.C.B., C. R. Markham, Esq., C.B., Captain R. F. Burton, and Baron Von Richthofen, and of ten other gentlemen as ordinary members.

NOTICE.

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THE
GEOGRAPHICAL MAGAZINE.

JULY, 1875.

CAPTAIN NAPIER'S TRAVELS IN
NORTHERN PERSIA.

CAPTAIN the Hon. G. C. Napier, who has recently returned to India after an adventurous tour in Northern Persia, has submitted to the Government of India a very full diary, kept by him during his travels, accompanied by a collection of routes and itineraries, most of which will prove of great service in the compilation of a fresh map of this important region. We are enabled to lay before our readers an abstract of the narrative, which is of a very interesting character.

Captain Napier left Gulahek, the summer quarters of the British Legation at Tehran, on the 3rd of July 1874, and thence journeyed eastward in the direction of Shahrud, along the ordinary road for caravans and troops. He expresses himself as much struck with the fertility of the land about Aineh-Vezan, heavy crops of cereals, maize, pulses, castor oil, and cotton being here raised. With assistance in digging wells and water-courses, and a good road across the mountains to Mazanderan, a large population might here be supported in plenitude. The road lay through Firozkoh, a village situated at the entrance of a rocky gorge, shut in by two opposing cliffs of limestone, between 300 and 400 feet high, and crowned with the ruins of an ancient fortress ascribed to Alexander the Great. Through Gursafid and Rudbar, Captain Napier proceeded to the sacred spring of Astani, which is chiefly remarkable for the great volume of water which issues from one point, and the complete sterility of the valley and the surrounding mountains from which it is fed. It is at the junction of one of the main routes from Mazanderan and Astrabad to Shahrud and Damghan, and is thus much frequented by pilgrims. Captain Napier then struck northward by the Tung-i-Shamsherbur Pass, a narrow passage about 150 feet long, and 18 feet wide, between two perpendicular walls of smooth limestone, a pass which he identifies with the ancient Caspiæ Pylæ, and thence through the Tang-i-Loodian defile to Shakoh. Here there are seams of good coal, which might be worked from the surface, but the people appear to be ignorant of its use. At Tash, however, a few miles off, there was a mine which had been worked for some time, the coal being carried to Gez to supply the Russian steamers. The working of the mine had ceased with the demand, the steamers being supplied from some nearer source, or by the substitution of "Baku oil" (naphtha?). Before approaching Shahrud many large villages are passed, all surrounded with walls and

watch towers, but the necessity for these defences has passed, for it is more than eleven years since a Turcoman has been seen on the plain except as a peaceful trader. At Shahrud the Russians have a large connection, and a good trade in cotton bales, raw silk, hardware, and candles is done by means of Armenian agents, who are under their protection. From Shahrud the captain's progress to Badasht, by way of Armyan, Miandasht, and Abbasabad to Mazinan calls for no remark. From the last-named place the caravan road keeps on due east to Sabzevar and Nishapur, but Captain Napier struck to the north-west and followed a new route leading through the mountains to Jagatai, the chief village of the Jouven State, and thence to the turquoise mines at Madan and Nishapur. Ferumud (17½ miles from Mazinan) is the first village, where there are the ruins of a very handsome mosque, dating presumably from the Arab invasion. Between Ferumud and Jagatai the great spur of Alburz, which runs south of Jah Jarn into the Nishapur plain, is crossed. The road runs for some miles across a level, uncultivated plain, thence it enters a narrow glen, and at ten miles reaches the crest of the ridge, and the pass into the wide valley of Jouven, beyond which, separated by a low ridge, lies the parallel valley of Isferayin, bounded by the Aladagh and Shah Jehan mountains. Both valleys drain westward. At the 30th mile from Ferumud, the road turns down a wide ravine running from the Kabizar about north-east, in the gorge of which lies the town of Jagatai, enclosed by a double wall and substantial flanking towers. From Jagatai to Kamaistan (18 miles) the road runs with a general direction of E.N.E.; the first 20 miles of the route from thence to Rabat-i-Gez (46 miles) is through the most fertile part of the Jouven Valley. Three miles from Rabat-i-Gez itself the valley contracts to a width of 8 or 10 miles, and a few miles further is divided by a low isolated hill into two undulating plateaus. Madan Bala, the next stage, is 25½ miles farther on; it is noted on account of its turquoise mines, the trade of which is almost entirely in the hands of a few local agents, who purchase the stones at the mines and send them to Mash-had, whence the best are exported almost exclusively to Russia. Although rival mines have been started elsewhere, the Government still derives an increasing revenue from Madan. About 2 miles on the road to Nishapur (28 miles) is a salt mine owned and worked by the villagers. From Nishapur Captain Napier journeyed to Mash-had, where he rested a few days, and thence made for Kelat, crossing the main

chain of this branch of Elburg Mountains, a range of hard gray limestones rising in sharp jagged teeth to a height of 6000 or 7000 feet. The track from Verdeh to Kelat he describes as picturesque beyond description. On one side steep slopes of purple, green, and brilliantly red clay and marl, with high projecting buttresses of sandstone, scantily clothed with fine specimens of juniper; on the other, peaks and crags of slate and limestones, the strata inclined, and sending out into the glen steep spurs, presenting often an unbroken sheet of rock for 1000 feet, with a sharp edge and distinct serrated outline. In places there is scarcely room for more than one horse to pass, and the track is carried from boulder to boulder in the bed of the stream, across very frail and shaky-looking temporary bridges. In the centre and narrowest part of a narrow defile a new gateway was being built, an imitation apparently of Nadir's gates, which have been swept away by successive floods, but which had been erected by him in order to close up the gaps in the rocky barrier of Kelat, and so create a safe retreat and stronghold for his descendants on his death.

After staying a few days at Kelat, Captain Napier returned to Mash-had, and leaving it by the north-west gate proceeded to Kazimabad. He had opportunity *en route* of observing the system of irrigation here practised (as well as in other parts of Persia), which consists in sinking wells at an average radius of $2\frac{1}{2}$ miles from the central point, and thence conveying the water through underground tunnels to the place to be irrigated, which thus becomes a perfect oasis. Where the soil is light and porous, the tunnel is often supported by short lengths of earthen pipe, but, as may be imagined, slips of earth are not unfrequent, and the cost of maintaining the *kanats* or canals is great. An inspection of the ruins of Toos, which lie about 4 miles north of Kazimabad, led Captain Napier to conclude that it was not earlier than the time of the Muhammadans, and that the town was built "to order" and not a gradual accretion of dwellings. Gunabad, Chinaran, Rodkan, Jafirabad, and Koochan were successively passed, the latter a square-walled town of about a mile a side, and much dilapidated, owing to a severe earthquake which took place two years before. The Koochan boundary in the Turkman direction is well guarded, there being posts of 200 or 300 horsemen on the border.

From Koochan, Captain Napier marched by an apparently new route to Taveel (24 miles) on the road to Deregez, passing several flourishing Kurd villages, inhabited by a race of men of a very different character from the majority of Persians, their features being handsome and regular, the eyes full and prominent, and beards ample. A glance at these well-fed, well-clothed ruddy men, their terraced vineyards, well-stocked orchards, and stretches of land dotted with ploughs or waving with grain, taken in conjunction with the fact that they are secured by a range of mountains impassable for many miles, for Turkman raiders, led Captain Napier to consider them as the most prosperous Persians he had yet seen. From Taveel to Chapooshloo is 21 miles, but the travelling is very rough, and the descent rapid into a valley fertile but uninhabited, owing to its liability to be devastated by plundering tribes. From the Kibkan stream there is a long stiff climb to the summit of the spur, and the pass of Allahu Akbar, from the east of

which a fine view is gained of the plain of Deregez, 3000 feet below. Tall watch-towers, in good repair, guard every path. From Chapooshloo to Muhammad Bagh (*sic*) is 8 miles, through vineyards, gardens, and over a well-cultivated plain. Captain Napier had an escort of 40 horsemen, under the command of the Khan's brother, provided for him, the Khan himself being absent at Mash-had. This ruler has about 800 horse in his pay, and 2000 badly-armed footmen might be raised on an emergency, but neither he nor the villagers have any means of obtaining remounts except through the Turkmen. Muhammad Bagh is defended by a strong outer wall on a good rampart with a wide and deep ditch, and an inner line of wall with towers. The border villages in the Attock, outside the hills, are always liable to attack from the Turkmen. They are consequently defended by good walls with towers and ditches, and guards of armed villagers are kept at the gates and on the walls. The villagers go to their work with matchlock and sword, waiting till the sun is well up, and taking care to get in before sunset. Though the Turkmen have been less active lately, Captain Napier was nevertheless informed that there is not a house in the twenty Attock villages that had not lost some member killed or carried off into a hopeless slavery, the usual ransom being from 10*l.* to 12*l.* 10*s.*, a sum far beyond the reach of an ordinary villager. For the first few miles from the foot of the hills the soil of the Attock is poor and sandy, and in some parts covered with saline efflorescence, while further out, a fertile belt from 4 to 20 miles wide abuts on the sandy wastes which reach to the Aral and to the Caspian. Cultivation in the valley and in the Attock is capable of almost unlimited increase and on irrigable lands in the latter, and on unirrigated lands in both. A very small quantity of silk is raised, and some cotton, tobacco and opium, the latter for home consumption. A few years ago its use was unknown; now it is largely consumed by all classes, but more especially by the khans and their suites.

Nowkhandan, famous for its wine (8 miles further on), was the next stage, and after that Duringar (24 miles), a collection of four hamlets on the banks of the Deregez or Duringar stream. A few miles beyond is the Dawund Pass, an easy one, by which the plateau of Koochan is reached. Isfirji, a large village lying buried in a rocky glen on the south face of the main range, is surrounded with terraced vineyards and orchards, and groves of plane and poplar. The finest fruit in Khorasan is said to be grown here, and finds its way to the markets of Mashhad and Subzevar, the apples, pears, and grapes being equal probably to the best in Europe. The earthquake that visited Koochan laid most of the houses of Isfirji in ruins, and appears to have travelled from north-west to south-east. At Sherwan Captain Napier was hospitably received by the Khan's *locum tenens*. The place is inhabited by about 1000 Turk families, the greater part of whom gain their living by agriculture; some carpets are made, and a good deal of coarse silk stuff for home consumption. Two or three hundred of the townsmen are armed with the *Shamkhal*, a long heavy rifle, or the *Khirli*, a lighter piece, and receive 2*l.* 8*s.* and two kharwars of grain per annum. Koochan is by far the most important of the border states; it is said to number altogether 200,000 inhabitants; and a proof of the slight degree in which they were affected

by the recent famine is to be seen in the number of children, in other parts of Khorasan it being rare to see a child of more than two or three years of age. Two and a half miles from Sherwan is a fine spring called Kara Kazan, considered by the people to be the source of the Attrek, though there is a higher permanent source about 15 miles to the north-east. From Sherwan to Chamaran is 22 miles, and thence Captain Napier travelled to Bujnurd, where he was visited by the Eelkhani and several of his principal officers. That official assured him that the road along the Attrek from Bujnurd to Asterabad, as well as the Gurgan route, was impracticable on account of the unfriendliness of the Yomud Turkmans, and so Napier crossed the Bujnurd Plain to the south of the Aladagh Mountain, which, stretching away to the west, forms a water-parting between the basins of the Attrek and Gurgan for about 50 miles. The valley of Shougan here for many miles is destitute of habitations, the fertile meadow lands, the produce of which would suffice to serve a whole district from famine, forming (as is the case with most of the fairest valleys of Khorasan) the neutral ground between plundering Turkmans and Kurds. The population of Chardeh or Sangkhas, 18½ miles beyond, is decreasing in a manner which it is very difficult to explain. Corn is raised for home consumption alone, land being extensively reserved for cotton, which finds a ready sale to Russian agents in Shahrud. An ascent of the Koh-i-Buhar, a few miles west of the route, affords a fair view of all the principal passes used by the Turkmans as far as Nardin, distant about 20 miles. From Sangkhas to Jah Jarm (20 miles) the route is dotted with small cairns, marking the place where some victim to Turkman raids has fallen. Jah Jarm is now a small straggling town of 400 houses, but in the time of Nadir Shah there were 5000 families resident there, the decline being entirely attributed to the devastations of the Turkmans, who destroyed all the irrigation works.

From Jah Jarm, Napier marched to Nardur (32 miles). The khan of this place had no horses to organize a proper reception, for his 200 horsemen had been summoned for inspection to Teheran, and being short of horses had emptied all his stables. From this place Napier's route lay down the valley of Nowdeh to Kanchi (16 miles), a district inhabited by a tall, robust and healthy-looking Turkish race. The glens and ravines are clothed with juniper to a height of 2000 to 3000 feet, above which is a dense forest of scrub elm, oak, and maple. The valley is for the most part closely cultivated, the fields being carefully terraced for irrigation, and fenced. From Kanchi a good path winds through the valley to Nowdeh, where the valley extends and opens into the Gurgan Plain. Nowdeh grows rice and wheat, and a little cotton. The people have a tradition that at some remote period the Caspian covered the plain running into the valley and forming a small bay, along the shores of which was a forest of date palms; the villages on either side of the bay used to communicate by boats, and had an extensive trade across the sea. In those times they paid a revenue of 4800*l.*, the produce of the sale of dates. The mountains were bare of forest, the present dense growth of deciduous trees having spread gradually from the west. In the whole range of the Alburz from Teheran to the Herat River, there is no point at which the chain could be so readily crossed

by either road or railway as on the line of the Nowdeh Valley, while good coal has already been found in the mountains to the west. Ramayan (12 miles) and Katool (22 miles) were the next stages, and thence the road to Asterabad (25 miles) lay through a magnificent park-like plain, extending from the foot of the hills to the Gurgan River. Rice and wheat is here cultivated, and cotton of a very fine quality for the Russian market. At Astrabad Captain Napier obtained some information regarding the trade in these parts, and learnt *inter alia* that English goods exported from Astrabad sell profitably at Khiva, no heavy import duties having as yet been put on our manufactures.

Journeying to Kurd Mohalla, 16 miles from Astrabad, Captain Napier had opportunity of observing the old highway of Shah Abbas, which must have been laid down with great care, being paved throughout with large pebbles from the numerous mountain streams, and drained by deep ditches fenced with good hedges. A small amount of money and pains would make a good passable track. Mulla Killa, a small port 2 miles from Kurd Mohalla, is frequented by Turkmans, who bring cargoes of salt and naphtha from Chelaken for the Astrabad market. The island of Ashurada is occupied by detachments of two regiments of Russian infantry, and is the residence of the commodore of the East Caspian squadron and other officials. Three or four small vessels of war and a few steam-launches are stationed in the bay to watch the Turkmans and collect the duty levied on their boats. These trade between their own ports and the village ports of Astrabad and Mazanderan, and the island of Cheleken, whence they bring cargoes of naphtha and salt. Every boat is strictly required to show the Russians a pass, and this enforcement has put an entire stop to the coast piracy of the Turkmans, which formerly was so rife. About 4 miles from Gez, a high green rampart of earth runs from the mountains through the forest and over the marshy plain to the shore. Its history is obscure, but the sea-face of the rampart being between 300 and 400 yards from the water's edge, affords a clear proof of the recession of the Caspian. Ashraf, which Captain Napier visited, is in a far better state than in the days of Fraser and Burnes. It now contains forty or fifty shops; three or four of the leading merchants have transactions with Constantinople and Astrakan, exporting cotton, sugar, European goods, cutlery, and hardware, and importing chiefly iron, iron vessels, crockery, &c. The famous garden of Shah Abbas is now entirely neglected, the buildings, fountains, and raised stone terraces being all in ruins. Its natural beauties are perhaps unrivalled. It is backed by lofty wooded heights, and to the north lies the blue bay of Ashurade. Several springs flow through it; the cypress trees are of gigantic growth, and several of them are covered with massive wreaths of wild vine. Orange and citron trees grow in wild luxuriance, their fruit being left to fall and literally covering the ground. Though now of little note, Ashraf should some day be the centre of one of the most important agricultural districts of Persia.

Captain Napier gives an interesting description of Sari, the principal town of the province and seat of Government, but its length will not permit us to reproduce it. Suffice it to say it is flourishing; cotton and wheat being exported, silks stuffs woven, and a good deal also done in leather work, while a good display of

articles from Western Europe proves that the Russians have a good hold on the market, but not a monopoly. Were the roads across the mountains better, English goods from Ispahan would command a large share of the market; their reputation is great, but their price comparatively too high. From Ashraf Captain Napier returned to Teheran by way of Barfarosh, the commercial capital of Mazanderan. This town has not regained the losses in population suffered during the plague of 1832, but is still a large town with an increasing trade. Its port Mash-had-i-ser, 8 miles distant, is said to be frequented by numbers of Russian ships and native craft, and a mail steamer calls once a week and takes up passengers and light cargo for Baku and Astrakan. The remainder of Captain Napier's journey calls for no special remark, though he adds a valuable appendix, consisting of notes on the topography of the Eastern Alburz tract, which will prove extremely serviceable in the construction of future maps. We must not omit to mention that the information derived from Captain Napier's journals indicates necessary modifications in Colonel Baker's map of Northern Persia.

RECENT RUSSIAN EXPLORATIONS IN WESTERN MONGOLIA.

I. SOSNOVSKI AND MIROSHNICHENKO ON THE UPPER IRTYSH, 1872-1873.

IN his Presidential Address to the Royal Geographical Society delivered last year, Sir Bartle Frere alluded to the important Russian explorations going on in Western Mongolia. These explorations have not been alluded to since that time in any periodical published outside the Russian frontiers, and we believe therefore that an account of them may interest the readers of the *Geographical Magazine*.

That portion of the Black Irtysh, which lies outside the Russian frontier was first explored, in 1872, by Captain I. A. Sosnovski (the same officer who has just been despatched to trace the great caravan route which leads from Hankou in China through Mien-hien and Hami to Kulja). He was succeeded in 1873 by Captain Miroshnichenko, already favourably known to geographers on account of the numerous astronomical positions determined by him since 1869. The reports of these officers have been published in the *Istvyestya* of the Russian Geographical Society.*

The Black Irtysh is by no means the rapid, broad, and deep river which former accounts made it appear. The inhabitants frequently ford it with their cattle, and even swim their sheep across it, which they would not venture to do if the river were at all rapid. Miroshnichenko found that the valley of the Irtysh slopes gently upwards from the Russian boundary at Ak Tube (1700 feet) to a spot 13 miles above Lake Ulungur (2300 feet). The current of the river between these two points varies between 84 feet and 289 feet per minute; it is slowest above the Ulungur, and swiftest immediately below the mouth of the Kaba. The river 13 miles above Lake Ulungur is only 75 feet wide; near the mouth of the Kran, 21 miles lower down, its width is 315 feet; thence to the

Burchum, a distance of 20 miles, it varies between 210 and 357; near the Kaba mouth it is 539 feet wide, and above the Koljir, close to the frontier, 686 feet.*

The depth throughout this extent, from the ferry 13 miles above the Ulungur down to the frontier, a distance of 111 miles, varies between 8 and 11 feet. There are numerous sand-banks and islands, the material for which has been derived from the sand-hills which bound the river for a considerable distance, and the navigable channel is frequently very narrow. Below the Kran it is only 21 feet wide, and even below the Kaba, where the Irtysh has already attained considerable proportions, it does not exceed 56 feet in width. Navigation is likewise interfered with by numerous fords. The lowest of these, $2\frac{2}{3}$ miles above the Koljir, only becomes practicable towards the close of September, and even then its depth is 5 to $5\frac{1}{2}$ feet, but many fords higher up are practicable soon after the spring floods, or at all events by the end of June. Of such fords there are three between Kaba and Burchum, four between Burchum and Kran, and numerous others in the upper course of the river. Near the mouth of the Burchum a ledge of rocks runs right across and forms a cataract, which puts a stop to navigation. Above these falls the river is navigable only in flat-bottomed barges.

Fertile tracts, covered with luxuriant grasses and dense woods of poplars, aspen, willows, and birch, are met with on both banks of the river, and particularly along the right one. The birch-woods in the Burchum Valley particularly attracted attention, and intending colonists would find there a plentiful supply of water, luxuriant pastures, excellent timber, and a favourable climate. This valley, as well as the main valley of the Irtysh as far as the Kran, is at present occupied by the Kireyi, a tribe of Muhammadan Kirgiz, about 7000 kubitkas strong. The members of this tribe hardly acknowledge the authority of the Chinese officials, and only pay taxes on compulsion. The Russians, on the other hand, are held in high respect, and the small remnant of authority still enjoyed by the Chinese is entirely due to the good offices of the former.

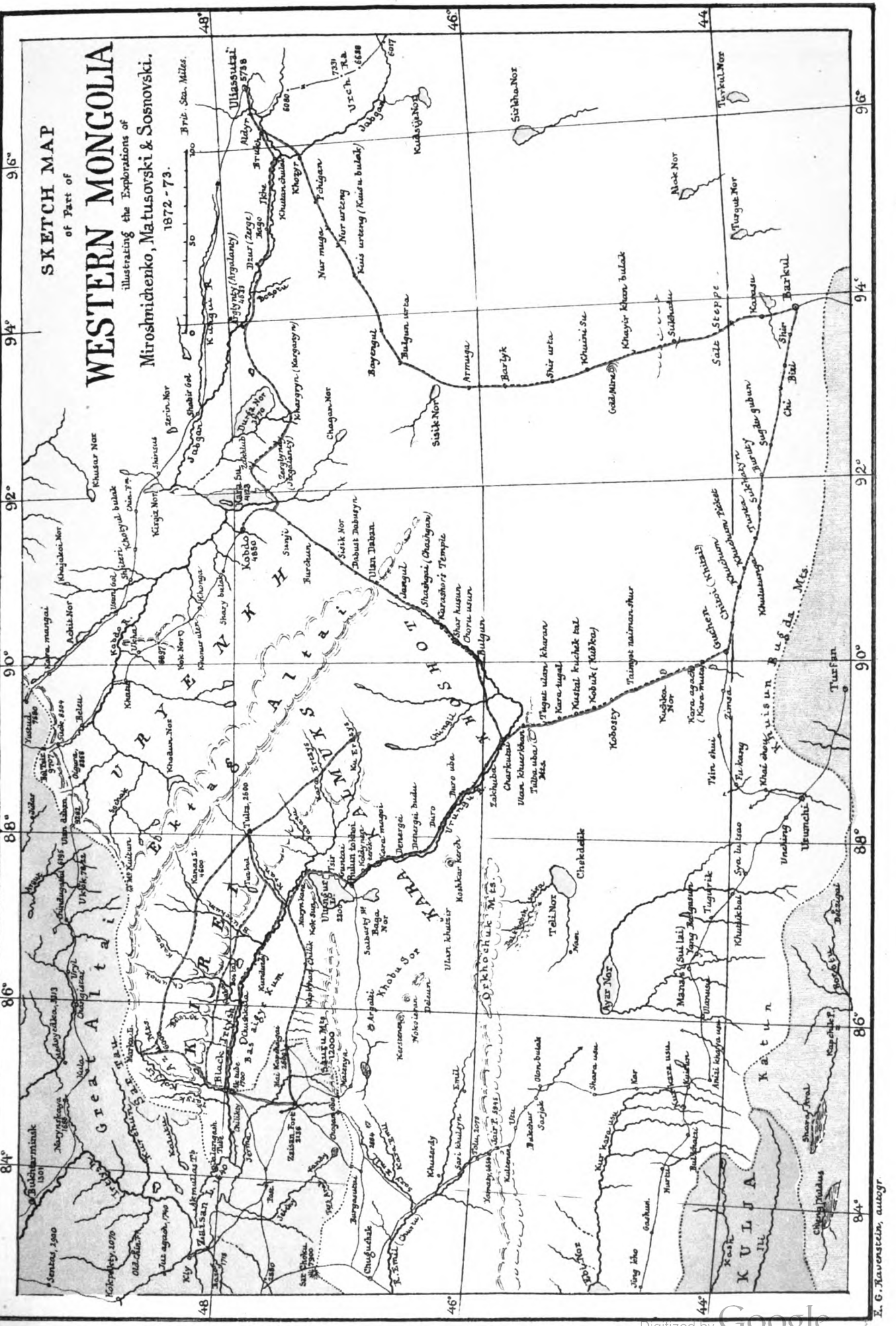
The Upper Irtysh, as well as the lower half of the Urungu Valley, are occupied by nomadic Kara Kalmuks, who are divided into ten tribes, each headed by a "Dzyanga" or "moshka." An "Ukherdai," who acknowledges the Chinese "amban," or governor, residing at Tulta, is the superior chief of all these tribes, and two "Ilgedais," each of whom governs five tribes, are his immediate subordinates. These Kalmuks number about 25,000 souls. They are very poor, and at enmity with their neighbours, the Kireyi, with whom they have almost daily encounters, frequently attended by bloodshed.

The Naryn-kara, a narrow ridge of hills, scarcely 2 miles across, separates the northern extremity of the Ulungur Lake from the Irtysh River. The district bordering upon this lake on the east is known as the "height" of Tsir Guntai, and consists of a plain covered with pebbles and shells, which has evidently been submerged at no very remote period. There are numerous salt lakes and salt pans scattered over

* The above figures are taken from Miroshnichenko's report, and differ to some extent from Sosnovski's measurements. According to the latter the width of the river is as follows:—at the Kran 105 feet; at an upper Ak Tube 210 feet; at the Kaba, where it overflows its banks, 700 feet; near the frontier 420 feet.

* *Istvyestya* X., part 1, p. 289, part 2, p. 26.

SKETCH MAP
of Part of
WESTERN MONGOLIA
illustrating the Explorations of
Miroslavichenko, Matusovski & Sosnovski,
1872-73.



there is much land fit for agricultural purposes. The Kirgiz of Koshembe's tribe irrigate a few patches by means of canals, and, in spite of their primitive methods of cultivation, their fields yield 15-fold and more.

Matusovski here turned to the east, and crossed successively the Tabyty Hills by a steep and stony path, the water-parting between Koljir and Belezek and the Azu Mountains (6000 feet), and on the 18th of July 1873, descended to Lake Marka-kul, whence the Koljir takes its rise. Whilst in the hills, the vegetation was limited to shrubs, but on descending the Azu Mountains in the direction of the lake the flora of the Altai burst upon our traveller in all its variety, and dense woods of conifers and foliferous trees covered the hill sides down to the very margin of the water. The shores of the lake and the valleys opening upon it were alive at that time with the kubitkas of the Kirgiz, and this enabled Matusovski to replace his worn-out and sick camels by fresh ones.

The densely wooded mountains, which rise steeply from the margin of the lake, do not admit of the passage of beasts of burden. Matusovski was therefore compelled to re-ascend the Azu Mountains. He then descended into the Chumak Valley, crossed the Jita Kaba or seven headstreams of the Kaba River, whose depth and rapid current considerably delayed him, and reached the Kamas Lake on the 28th of July. This lake lies in a deep and narrow hollow, at an elevation of 4600 feet above the sea. It is scarcely more than an enlargement of the river bearing the same name, about two-thirds of a mile wide and $11\frac{1}{2}$ miles long. The mountains rise steeply from its shores and are covered with dense woods of conifers. Matusovski crossed the southern end of the lake on a raft, and then turned to the south-east, in the direction of Tulta, which he reached on the 9th of August. It required much persuasion to induce the Tsagan-kegen to permit Matusovski to continue his journey towards the east. At length he was able to start, and pushed his way for 93 miles into the country of the Kalmuks, as far as the Ku Irtzys, the most easterly head-river of the Irtysh. He then retraced his steps to the Kran, descended that river to the valley of the Irtysh, and, skirting the foot of the Altai, crossed the lower course of the rivers which on his journey out he had crossed higher up. Matusovski is of opinion that the country visited by him offers great advantages to colonists. The banks of the Kurtu (a tributary of the Kran), the Burchum, Kaba and Koljir, where at present only a few patches are cultivated, abound in pastures and woods, and offer every facility for the establishment of prosperous agricultural settlements on the largest scale. The Chinese begin to appreciate the advantages of these localities, and the Tsagan-kegen is said to be desirous of forming a settlement on the Kaba River, which would moreover enable him to bring back the nomadic Kirgiz to their former condition of dependence.

M. Matusovski is very sanguine with respect to the prospects of trade on the Upper Irtysh. The district bounded by the Ektag and Sauru Mountains has a population of some 45,000 souls. Up to 1869 the trade carried on there by Russian merchants was of a very limited nature. In that year the Chinese empire was thrown open to their enterprise, and the exports rose rapidly. In 1870 "permits" were granted at Semipalatinsk for exporting merchandise of the value of 119,616 rubel; in 1871 this amount increased to

140,112 rubel; in 1872 to 143,573 rubel, and in 1873 (up to October) to 218,995. Permits were likewise issued by the local authorities of the Zaisan and elsewhere, whilst many dealers do not trouble about permits at all. Taking every circumstance into account M. Matusovski considers that the trade done in 1873 reached a total of 600,000 rubel (56,000*l.*), and as the Russian trader in his dealings with the nomads has not to encounter the competition of the Chinese, he is able to realize a profit of 100 per cent. and more!

Matusovski has made a route survey of his journey, extending over 514 miles; he has determined numerous altitudes, and collected a vast amount of information with respect to the roads leading from the Irtysh Valley to Kobdo, and the encampments of the Kireyi and the Naiman tribe not subject to Russia.

III.—A RUSSIAN CARAVAN JOURNEY TO KOBDO, ULIASSUTAI, AND BARKUL.

IN 1872 M. Savva Morozof, a Russian merchant, despatched a caravan to Dzungaria and Western Mongolia. This caravan started from the Russian post near the Zaisan Lake, and having reached Bulun-tokhoi on the Urungu, a distance of 266 versts (153 geo. miles) from Zaisan, it visited successively Kobdo, Uliassutai, Guchen, and Barkul. The Mandarins of the latter town refused to admit the Russians. They averred that their town was in Kansu, and not in Mongolia, which alone had been opened to Russian traders. The leader of the caravan therefore returned by way of Guchen to Bulun-tokhoi. The following notes respecting this journey were obtained by M. Sosnovski from the leader of the caravan.

I.—BULUN-TOKHOI TO KOBDO.

	Versts.		Versts.
1. Burul or Bulun-tokhoi (47° 5' N., 87° 25' E.), to Koldynen-terek, on right bank of Urungu . . .	17½	13. Temple of Karashor (a Khan of the Khoshotes)	10
2. Kara-magoi (village and post)	16	14. Shashgai (post)	22
3. Den-ergei (post)	35½	15. Jungul (spring in mountains)	31
4. Den-ergei-budu (post)	15	16. The Great Ulan-Da-baga	13½
5. Dúro (post)	27	17. Dabust-Dabusyn (salt lake and spring)	24½
6. Dúro-uba (post)	35	18. Sisiknur (spring)	14
7. Zakhuba (post)	22	19. Buchun (spring)	29½
8. Charkutai (post)	19	20. Sunshi (rivulet)	22
9. Chingil (river)	39	21. Sunshi (lake)	14
10. Bulgun (river)	31	22. Kara-su (large lake)	18
11. Choru-usun (post)	22	23. Khobdo (town)	22
12. Shar-khusun (post)	18		
		Total	517½
			(298 geo. miles).

The road throughout is good and practicable for carts. The posts merely consist of a few huts inhabited by three or four soldiers, who serve as guides and carry the mails. Beasts of burden may be procured amongst the Kalmuks and Uryankhes near the road. As far as Charkutai the road follows the right bank of the Urungu River, the banks of which are covered with meadows and woods, the wild olive-tree predominating. The river averages about 100 feet in width; its current is slow, and it can be forded at many places even after the spring floods.

The camping-grounds of the Khoshotes, a numerous and wealthy tribe, are met with on the rivers Chingel and Bulgun, the banks of which are covered with small poplars and ash. On reaching the Bulgun the road follows the right bank of that river as far as the temple

of Karashor, where it crosses to the left bank. The temple is a large building of stone.

During the following days' journeys, as far as the Sunshi Lake, fuel was found only in small quantities. The great Ulan-Dabaga is a pass over a branch of the southern Altai. It is practicable for led animals; carts cross by a path further south. The Altai terminates here, and to the south of that pass there are only detached hills.

II.—KOBDO TO ULIASSUTAI.

	Versts.		Versts.
1. Kobdo to Kara-su (lake)	28½	9. Zergö on Jabgan River	19
2. Same lake	21	10. Baga (spring)	19
3. Sakhgub spring, on crossing the Araftübe Mountain	26½	11. Ike (on Jabgan River)	19½
4. Zerglyndy spring	26½	12. Khutum chulak (on same river)	19
5. Khar-gryn	25	13. Brukh (post on Uliassutai River)	28½
6. Durganor (salt lake)	25	14. Aldyr (post on Uliassutai River)	22
7. Arglynty (well, cross a desert)	35	15. Uliassutai (town)	16
8. Bogotu (a rivulet, after having crossed a desert)	27		
		Total	357½
		(204 geo. miles),	

This road was explored in 1870 by M. Matusovski, and subsequently by Mr. Ney Elias (*Journal Royal Geographical Society*, vol. xliii.).

Uliassutai had not yet recovered from its destruction in 1870, but the authorities are resolved to reconstruct it, and materials had been collected for that purpose.

III.—ULIASSUTAI TO BARKUL.

	Versts.		Versts.
1. Uliassutai to Aldyr (post)	16	12. Armuga (spring)	26
2. Brukh (post)	22	13. Barlyk (post)	24½
3. Khozyr-urta (post)	19	14. Shir-urta (post)	39
4. Khozyr No. 3 (post)	17½	15. Khuiny-su	22
5. Pichigan (station)	31	16. Khayir-khan-bulak (spring)	39½
6. Nur-muga (spring)	15½	17. Sukhatu (post)	26½
7. Nur-urten (spring)	15½	19. Karasu (settlement)	65½
8. Kuis-urten (well)	22	20. Barkul (town)	26
9. Bayengul (spring)	43		
10. Bulgun-urta (spring)	17½	Total	519
11. Sisiknur (lake)	31	(298½ geo. miles).	

The river Uliassutai is crossed on the road to Khozyr-urta, and the Jabgan at Khozyr No. 3. At both these places grass and fuel abound. Pichigan affords neither, and water likewise is scarce. The two following springs are in the midst of meadows. At Bayengul there are extensive salt-swamps, and Bulgun-urta spring flows into a small salt lake. Some hills, of no great height, are crossed near that place, and the road then turns towards the left (south-east). Half-way to the Sisiknur Lake there is a spring. The water of the lake is brackish, but forage is found near it. The road thence, as far as the Armuga spring, is stony, but level. The three following pickets lie in the hills, near small springs. There is but little forage. The summits of the hills and detached heights are covered with shrubs of larch. Half-way on the road to the Khayir-khan-bulak spring there is a gold mine, which was formerly worked on Government account. The works have been stopped, owing to the unsettled times, but a guard of sixty Chinese soldiers is maintained, nevertheless, to keep off private adventurers. Sukhatu is built on a rivulet, in the midst of a wood of considerable extent. Forage is but scarce there. The road thence to Karasu leads over a plain covered with a crust of salt. Karasu has about a thousand inhabitants, Chinese and Mon-

gols. It lies at the foot of a hill, in the midst of orchards yielding pears and apples. The inhabitants till the soil, and grow principally wheat, which yields a bountiful return. Barkul, which the members of the caravan were not allowed to enter, is a very large place at the foot of snow-covered mountains, which are visible already half-way from Uliassutai. It has a strong Chinese garrison, and two citadels. Hami (Khami) is three days' distant, and thence to Lan-chau, the centre of the rhubarb trade, is twenty days' journey.* Khami has three forts. The nearest places occupied by the Dungans are Su-chau and An-si (Ngan-si-fan), both to the south-east, in Kansu.

IV.—BARKUL TO GUCHEN.

	Versts.		Versts.
1. Barkul to Shir (post on a spring)	16	9. Tuntu (post)	22
2. Bizi (do.)	22½	10. Khulutunga (post)	19
3. Chi (well)	22	11. Khuchun (post)	22
4. Spring in mountains	18	12. Khuchun (village)	27½
5. Spring on leaving mountain	26½	13. Deserted post in the territory of the Torgout	17½
6. Sugdu-guburn (station)	17½	14. Ruins of Chittoi	31
7. Burnty (post in mountain)	22	15. Guchen (town)	22
8. Sukhatyn (post)	18		
		Total	323½
		(184½ geo. miles).	

This road, though practicable throughout for carts, has been abandoned in consequence of the rebellion of the Dungans. It leads across numerous low off-shoots from the Thian-shan, which are generally wooded. Guchen lies on a small rivulet; timber is found in its neighbourhood. The ruins prove that it has no more escaped the consequences of the Dungan rebellion than other towns, but new buildings are springing up fast. Chittoi and Zimsa, the latter 30 versts in the direction of Urumchi, have suffered the same fate, but all these towns are held now by strong garrisons. At Guchen and Zimsa the caravan did a satisfactory amount of business, taking principally silver in payment. Zimsa is a considerable place, on the banks of a large river, and near the wooded Khuisanbugda Mountains. From Guchen to Urumchi is four days, thence to Turfan five days. At the latter place large quantities of wool had been stored up. One day's journey this side of Urumchi there is a large town named Khozmudi, whence there is a direct road to Manas. There were about 300 peaceable Dungans at Guchen during the stay of caravans there, who kept cookshops and engaged in trades, but when the news arrived that Kobdo had been captured by the Dungans, the Amban had all of them executed.

V.—GUCHEN TO BULUN-TOKHOI.

	Versts.		Versts.
1. Guchen to Kara-agach (Kara-muta), a spring	17½	8. Kara-tugal	10
2. Station near desert	13½	9. Tugut-ulan-kharan	17½
3. Kuchkanur lake	22	10. Ulan-Khuyerkhan, near the Tulba-uba mountain	18
4. Deserted post Taimyst-naiman-shur	26½	11. Charkutai (post)	19
5. Deserted post Kobusty	22	19. Bulun-tokhoi (same as route 1)	187
6. Kobuk or Kubka (spring)	17½		
7. Kustal-Kuchektal	22	Total	392½
		(184½ geo. miles).	

* Lan-chau-fu, according to the Jesuits, lies in latitude 36° 8' 24" N., longitude 103° 55' E.; according to the Ta-tsing Atlas, in 36° 5' 24" N., 103° 54' E. Hami, according to the latter, is in 42° 53' N., 94° 35' E. The distance between these two places would therefore amount to 1200 versts, which could hardly be accomplished in twenty days.

The road throughout is level and practicable for carts; there is good forage, and wood for fuel, and water are found in sufficient quantities.

IV.—NOTES ON OUR SKETCH MAP.

Our Sketch Map is intended to illustrate the accounts printed above, and does not embody the whole of the information available with respect to the country delineated. It is based upon the points determined astronomically by Struve and Miroshnichenko, and embodies a good deal of the information contained in the Russian staff map of Central Asia (edition of 1874), and of Veniukof's map of Mongolia. The positions along the road from Uliassutai to Suok have been laid down from Mr. Ney Elias's map, but a number of names has been added from Russian sources, which serve to supplement the topographical detail of Mr. Ney Elias's map. We have likewise inserted a large number of altitudes. In doing this we have discovered a considerable discrepancy in the height of Suok as determined respectively by Mr. Ney Elias and M. Miroshnichenko. According to the former that Chinese picket is at an elevation of 6302 feet above the sea level, whilst the pass to the north of it attains a height of 8550 feet. Miroshnichenko, whose work is generally considered to be very trustworthy, places Suok at an elevation of 8504 feet, and the Bol-Tsir Pass at 9707 feet. The difference between the two observers thus amounts to 2202 and 1157 feet respectively.

A TURKISH ACCOUNT OF YEMEN.*

A WORK recently published at Constantinople contains a valuable account of the history and geography of Yemen, all the more interesting to English readers on account of the complications which arose some time ago with reference to the protection extended by the British Government to the Arab tribes dwelling in the vicinity of Aden.

The year 1635 saw the downfall of Turkish power in Yemen, and until within the last few years the Turks merely held a few places along the coast. The opening of the Suez Canal impelled the Government of the Porte to turn its attention to these neglected provinces. The canal in the hands of the French, Aden and Perim in those of the English, might place the Turks in a critical position, should these two powers combine for hostile purposes. Yemen might then fall an easy prey to them, and they might even threaten Mekka and Medina, the sacred sites of Islamism, the possession of which insures to the Sultan his pre-eminence amongst Muhammadan sovereigns.

These considerations influenced the councils of the Turkish Government, and when Muhammad-bin-Aidh, the Emir of Asir, expelled the Turkish garrison from Hudeide, in 1870, it was resolved to despatch an expeditionary force, not only to punish him for his audacity, but also to restore the sovereignty of the Porte throughout the whole of South-Western Arabia.

* *Tarikh-i-Yemen ve Sana*, by Colonel Haji Rashid Bey. Constantinople, 1875. We are indebted to the pages of the *Allgemeine Zeitung* for a knowledge of the contents of this work. Its translation into English by one of the *attachés* of the embassy at Constantinople is much to be desired.

Mehemid Redif Pasha, at present Governor of Bagdad, was placed in command of the troops, who landed on the 11th of February 1871, in the harbour of Gunfude. The conquest of Asir was accomplished in the course of that year. The enemy generally retired after exchanging a few shots, and the losses on the field were not severe. But cholera, fevers, dysentery, and sunstroke, as well as the fatiguing marches through the burning sands of the Tehama, and the rocky mountains of Jebal, cost a good many lives. In November, however, a civil government had been established, Turkish garrisons held the most important places, and the bulk of the troops were about to start for Yemen, when the pusillanimity of the newly-appointed civil governor put a stop, for a time, to further operations. This exemplary government official was afraid to trust his precious life in so dangerous a country, and failing to get a certificate of ill-health from the regimental surgeons, which would have enabled him to return to Constantinople and its attractions, he rendered himself up to complete inactivity, and thus imperilled the conquests made. Under these circumstances the commander-in-chief insisted upon his dismissal, and the troops only left after his successor had been installed in office. Redif Pasha, having contracted a serious illness during the siege of Ride, the principal stronghold of Asir, now returned to Constantinople, and the command of the invading army devolved upon Ahmed Mukhtar Pasha.

Early in the following year a landing was effected at Hudeide, and on the 16th of March 1872, the army left for the interior. During the first few days, owing to the excessive heat of the Tehama, the troops only marched during the night. Their progress in the direction of Sana was checked soon after they entered the mountains. The Ismaelites, who had established themselves in the district of Haraz, offered a spirited resistance. One hill fort after the other was captured, and in April 1872, after a nine days' bombardment, the Turks succeeded in gaining possession of Atara, the chief stronghold, and with it of the persons of Hasan bin-Ismael, the Dai or religious leader of the sect, and of his two sons. They all three died soon afterwards at Hudeide, from typhus, it is said, and as the father had attained an age of 130 years, whilst one of his sons was epileptic, and the other idiotic, there is no reason to suspect foul play.

Sana, the capital of Yemen, voluntarily opened its gates on the 25th of April. Mühzin Shehari, a descendant of the Imams of Yemen, had kept this town in a state of blockade for a number of years, but the Bedwins, who acknowledged his authority, were incapable of resisting the rifled cannon and needles of the Turks, who were hailed as liberators by the inhabitants of the town.

The conquest of the remainder of Yemen was effected by four smaller bodies of troops.

1. The hill forts in Kaukeban mostly fell an easy prey, but Kaukeban itself, favoured by its extraordinarily strong position, resisted for six months, and only surrendered on the 24th of November 1872. It had been besieged according to all the rules of military art, and the most remarkable work of the engineers consisted in a bridge thrown across a fearful precipice. The districts to the north of Kaukeban were subdued by the end of January 1873.

2. The district of Reme, to the east of Hudeide,

which is inhabited by 153 different Arab tribes, occupying about 900 villages, was conquered by a column commanded by Haji Rashid Bey, the author of the work under notice, who accomplished his task by the middle of June 1872.

3. Southern Yemen, including Taáz, was captured by a body of troops, who started from Mokha on the 22nd September 1872.

4. The conquest of Anes, to the south of Sana, was accomplished in December and January.

The subjection of the intervening districts, and especially of the whole of the coast, had been effected by the end of April 1873, and the conquest of the larger portion of Yemen thus occupied only fourteen months. The districts of Marib, Yam, Zaade, and others in the east and north-east, do not, however, as yet acknowledge Turkish rule, and the conquest of Lahej, in the south, was frustrated by the threatening position assumed by England.

The number of troops engaged in these campaigns was 22,000, of whom about 4000 died between Jan. 1871 and April 1873. Of these 4000 only about 300 were killed in battle, or succumbed to their wounds, 1700 died from cholera, and the remainder from other diseases.

The conquered territory now forms the Vilayet Yemen, and is occupied by the seventh army corps, specially organised for that purpose. The capital is Sana. The Vilayet is divided into four Livas, and these into twenty-three Kazas, as follows :—

I.—LIVA SANA, Capital SANA.

1. Jebel Haraz.—Menakha (capital), Sa'fan, Mefhak, Orr.
2. Kaukeban.—Kaukeban (capital).
3. Amram.—Amram (capital), Beit Mukaddem.
4. Anez.—Hanuran (capital), Jehran, Othuma.
5. Yerim.—Yerim (capital), Ammar.

II.—LIVA ASIR, Capital MAHAHL.

1. Ebha.—Menadhir (capital), Hali, Shehran, Refidet el Yemen.
2. Sabia.—Sabia (capital), Dharb u Shakik, Umm el Hashab.
3. Rijal el Ma'.—Betile (capital).
4. Gunfude.—Gunfude (capital), Duga.
5. Beni Shehir.—Tenumu (capital), Bishhe.
6. Gamid u Zohran.—Ragdan (capital).

III.—LIVA TAAZ.

1. Taáz.—Taáz (capital), Zi Sefal, Hojerie (a tribe).
2. Mokha.—Mokha (capital), Khur Sheikh Said (opposite Perim).
3. Aden.—Aden (capital).*
4. Medinetein.—Aebb (capital), Mekhadir.
5. Ka'taba.—Ka'taba (capital), Hauashib (a tribe).

IV.—LIVA HUDEIDE.

1. Hudeide.—Hudeide (capital), Abes, Melham, Haffash, Be'ra, Beit el Fakih.
2. Abu Arish.—Abu Arish (capital), Jazan.
3. Zebid.—Zebid (capital), Hes.
4. Luheia.—Luheia (capital), Zahra.
5. Jebel Reme.—Jebbi (capital), Ja'ferie, Kúsme, Selfie.
6. Bajel.—Bajel (capital).
7. Zeidie.—Zeidie (capital).

The population of Arabia is estimated by the author as follows :—

Yemen and Asir	2,252,150
Hadhramaut	1,550,000
Oman and Maskat	1,350,000
Nejd (Bahrein, Katif, Ahsa, Deraya)	2,350,000
Hijaz, Aneze, Tehama of Hijaz, Belad i Kasam a Jebel Shammar	3,250,000
Total	10,752,150

* Aden is thus looked upon by the author of this book as a portion of the Turkish dominions. The Hauashib mentioned further on are a tribe under British protection. This prospective geography may possibly lead to certain inconvenient questions being asked at Constantinople.

The author furnishes his readers with a full description of Yemen and Asir, based to a large extent upon personal observations, and renders an interesting account of the natural productions of the country.

We trust his work will find a translator.

PARAGUAY.

AMONG the republican states of South America, the financial difficulties of which have recently given them such unenviable notoriety, Paraguay, the earliest of the Spanish colonies of the great basin of La Plata, has a high interest both on account of the vicissitudes of its past history, its present straits, and remarkable position politically and socially. A few words may suffice to recall to the reader the leading features of its former story.

In their search for the rumoured El Dorado, the Spanish adventurers of the beginning of the 16th century, led on then by their countryman Sebastian Cabot, were the first to sail up against the rapid current of the great river Paraná, and to discover the branches of this waterway into the heart of South America. On its tributary, the Paraguay, they founded the city of Asuncion (in 1536), which for the greater part of a century was the chief place of the Rios de la Plata, the seat of the Captain-General, and the centre from which radiated all efforts at the subjugation of the native Indian tribes, and all further search after the fascinating golden regions of the north-west. It was not till the beginning of the 17th century that the countries south of the confluence of the Paraguay and Paraná were separated from the Government of the northern territory which still bears the name of Paraguay. To the rule of the gold-seeking soldiers of Spain followed that of the Jesuit fathers, whose influence nowhere extended so rapidly as in South America, and nowhere on that continent so marvelously or with such favourable results as amidst the tribes of the mild race of the Guarani. For upwards of 150 years, under Jesuit discipline, a state of civilization in which not only agriculture, but several of the minor arts flourished, was maintained among the Indian population of the South and East of Paraguay. On the expulsion of the fathers (in 1768), the missions drooped, and the Indians for the most part retired again from the villages and fields to the wild forest.

The date 1811 is celebrated in Paraguay as that of the "first day of liberty," when that country asserted its independence not only of Spain, but also of the other States of La Plata. A few years later this liberty and independence of the people of Paraguay were exchanged for abject submission to the stern dictatorship of Dr. Francia, whose policy of non-intercourse closed the country to the outer world for a quarter of a century, only two of its river ports being open to trade, and that only under special restrictions. To him succeeded, in 1844, the elder Lopez, as president of the republic, retaining an authority not less absolute and unquestioned than that of Dr. Francia, but exercising it in a more liberal policy, opening the rivers to foreign trade and gradually improving the condition of the people. The career of the younger Lopez must be freshly remembered: in the earlier years of his presidency he certainly carried on that policy of advancement and improvement, which, if it

had been allowed to last for a few years longer, must have raised Paraguay to a first rank among South American powers. The country was wealthy and without debt, and well stocked with cattle; roads and posts were well maintained throughout the western portion. Railways were planned and Europeans engaged to instruct native artisans; law and order were most strictly upheld. Fired by the ambitious desire to found an empire on the Paraná, and trusting to the internal strength of his country, Lopez began that fatal seven years' war with Brazil and the Argentine Republic which more than decimated the population of Paraguay, and so completely ruined the land as to make recovery appear almost hopeless. So strong was the country, so full of wealth and resource, that it could hold these opposing powers at bay for seven years, and so completely had the doctrine of submission been instilled into the people from the times of Francia, that Lopez could drain the land to the last dregs of its life and materials, before he himself was killed, after being driven, with the last handful of men, slowly backwards into the far interior of the country.

On the conclusion of the war in 1870, a provisional Republican Government was formed by the remnant of the Paraguayans, which a year later took a more permanent form. It was at this time, and with a view to recoup in some degree the disasters and miseries brought on by the war, that loans from England were sought. What with doubtful transactions in England, and simple robbery of the amounts which reached Paraguay, these loans have not tended in any way to forward the object with which they were planned, but have rather had the effect of completely ruining the credit of Paraguay. Several revolutions have disturbed the country since the war, overturning the existing Government in almost every case, and still farther, wearing out the little strength remaining to the land. After the war, Brazil and the Argentine Republic each maintained a garrison in Asuncion, in support of the obligations due to these powers as the conquered country; the Brazilian garrison of about 6000 men still remain, but in the middle of last year the Argentines retired to their settlement of the Villa Occidental (originally the French colony of New Bordeaux), a little way above Asuncion and on the Chaco side of the Rio Paraguay. The last revolution was that of April 1874, when Asuncion was invested by an insurgent force quite strong enough to have very easily overturned the Government in the city had it not been for the presence of the Brazilian troops there. The Government appealed to the Brazilian minister, who then for the first time interfered actively in procuring the peace of the country by permitting the force in garrison to march out and disperse the revolutionary force.

The question of the limits of Paraguay with Brazil, long disputed, was decided by treaty in 1871, and the frontier on that side has been carefully surveyed and marked out by a commission which was in operation during 1873-74. The line runs along the Rio Apa to its source (the Estrella), then along the water-parting of the central cordillera to where it meets a lateral ridge forming the south side of the basin of the river Ygati, along which minor parting the boundary runs to the Salto Guayrá on the Upper Paraná. Till very recently, however, several questions of limits remained to be decided between the Argentine Republic and

Paraguay: the latter claimed the province of Misiones on the Argentine side of the Paraná, the island of Cerrito or Atajo, at the confluence of the Paraguay and Paraná, commanding the mouth of the former river, besides a space of the vast unknown plain of the Gran Chaco northward from the Rio Pilcomayo to the frontier of Bolivia. These disputed points appear to have been decided now at Rio Janeiro by the Brazilian Government (on behalf of Paraguay), and an envoy from the Argentine Government. The Southern Misiones and the island of Cerrito henceforth belong to the Argentine Republic, and it has been left to arbitration to decide the proprietorship of the Chaco north of the Pilcomayo. Since Paraguay is not only unable to occupy any part of the Chaco territory, but cannot prevent the encroachments of the wild Chaco Indians, who, knowing the weakness of the country, come across the Rio Paraguay from this very disputed area to occupy the more fertile lands of the eastern side, it does not seem probable that the award will be in favour of the feebler republic.

Paraguay, shorn of its exterior claims, thus remains a compact area girt about by the Upper Paraná and Paraguay Rivers, comparable in extent with England and Wales. A central cordillera of moderate elevation (1000 to 2000 feet), running parallel to the great rivers, divides the country into two slopes, an eastern and a western. The western shed to the Rio Paraguay, characterised rather by wide *grancampos* than by forests, and traversed by several navigable tributaries of the Paraguay, is the civilized side of the country; the opposite slope to the Paraná, a region of dense forests, is inhabited by scattered Indian tribes, remaining very much in a primitive condition, undisturbed by the movements on the opposite half of the country.

The population of the western slope, mixed Spanish and Indian, is believed to have been about a million and a half before the war, but does not now exceed one hundred thousand, so great was the destruction of life during the contest: of those remaining, about 80 per cent. are women. Many of the outlying districts of this side, south and north, have been completely deserted since the war, the people drawing in to the more central lands round the capital. No even approximately correct estimate of the numbers of the independent Indians of the Paraná side, Canguás, Tupi, and Guayanas, can be made, but there are probably not less than 10,000 of these.

Worn out by war, its population decimated, burdened by enormous debt, and ruined in its credit, the natural resources of Paraguay would need to be great indeed to enable it ever to recover an independent position. Let us glance at the chief of these possible aids to future recovery. Nearly three-fourths of the cultivated lands of the western side of Paraguay are owned by the Government: the larger portions lie to north and south; in the central districts public and private properties are mixed in apparently inextricable confusion, a tribunal judging claims to land which may have been confiscated in earlier times by Government, or which may have been abandoned by their owners during the war, now in session at Asuncion, was an arduous task. The country is eminently fertile, possessing immense tracts of rich pasture land: its capabilities as a cattle-breeding country were well proved by its wealth in this respect before the war. At present there may be said to be no native cattle in

the country: the whole of the meat supply for the districts about the capital is in troops of oxen, driven from the Argentine province of Corrientes, which cross the Paraná by various passes and make a long and tedious march through the southern esteros of Paraguay, to the markets of Asuncion and Villa Rica. Provided that the country was in the hands of a stable Government, there could be no more favourable object for the introduction of capital into Paraguay than for that of cattle breeding.

The value of the forest timber of Paraguay and the almost indestructible qualities of most of its hard woods are well known, and the supply is inexhaustible. At present a considerable quantity of squared timber is sent down in rafts from the interior tributary rivers of the Paraguay, to the lower towns of the Paraná. As population and building increase in the timberless grass plains of the Lower La Plata, this industry must grow in proportion. The special product, however, of the country, the export of which has always been its mainstay, is the Yerba maté or Paraguayan tea. This is not a cultivated product in any sense: the bushy evergreen tree which yields it is scattered more or less thickly all through the forests of the central cordillera, and the processes of tearing down the branches and twigs, of drying and pounding the leaves, and packing these into hide bags, is carried on in the rudest and most clumsy fashion. If capital were introduced into this industry, by means of which roads might be made to the Yerbales, the forests cleared of undergrowth to allow free access to the tea trees, and suitable appliances contrived for the preparation of the yerba, the tea might, it is believed, be produced not only in a much superior and surer way, but at about half the present cost. Although China tea has now to some extent taken the place of yerba as a beverage in the towns of the river Plate, yet in the interior camps maté is still exclusively used, and though yerba grown in the southern provinces of Brazil competes there with that from Paraguay, yet the latter is of finer quality and is always preferred.

Every little rancho throughout Central and Southern Paraguay has its patch of tobacco; the bulk of this harvest is collected by Corrientine traders, but very little of the last gatherings, the best leaf, ever quits the country. Cigars are manufactured to a considerable extent for export, and some of those made in the neighbourhood of Villa Rica have been sent in some quantity to England, it is believed with success, though the tobacco used in their manufacture is very inferior and much below the average.

Neither coffee nor indigo are now grown in Paraguay, though many districts are admirably suited to these products: the native cotton of good staple is used entirely in domestic manufactures, woven into strong coarse cloth in rude handlooms, or made into the hammocks which are in use all through the country. The sugar-cane is not very widely grown, and might be cultivated on a large scale with success. Molance or "miel" forms an important article of food with all Paraguayans, and the white rum, or caña, distilled from the fermented juice, is a pure and wholesome spirit much prized in the down-river countries; indeed, everything that is Paraguayan is held in high esteem on the lower river Plate. Paraguayan men, by their courage and endurance during the war, have earned for them-

selves great respect. Paraguayan yerba, tobacco, and caña are far preferred to the Brazilian.

Attempts at European colonization in Paraguay have hitherto failed. The summer climate is certainly unsuited to the European agricultural labourer, though the proportion of toil necessary to be expended on the land is small in comparison with that of a colder region: but the failures seem to have been attributable rather to the choice of men for colonists, who were quite incapable of aiding themselves in any country, than to any circumstances of soil or climate. Two or three colonists who remain in Paraguay, men of previous agricultural experience, have sufficiently proved the possibility of European colonization, being now settled independently in their own ranchos, surrounded with good patches of land cultivated by their own hands, and yielding a fair return. It is not probable, however, that in the face of the lamentable failures of the several efforts of European colonization that any further schemes of this sort will be proposed: the introduction of coolie labour has on the other hand been spoken of, and in no country could the conditions be more favourable for such immigration. The Chinaman's talent for rice-growing might have unlimited scope in the vast "esteros" of the former missions. The mineral wealth of Paraguay is not great: iron was worked on a small scale in the time of Lopez; gold has been found, but in quantities too small to repay working, though it has been sought for diligently by experienced men in all likely districts; coal may possibly be found at some future time in the central cordillera; a few seams of useless shale are only known at present.

The old dream of El Dorado, however, still haunts the people of Paraguay, who can conceive no other motive of travel in their country than the search for gold; the sextant and barometer were always looked upon as implements for divination of the presence of the precious metal.

Capital and labour are both utterly deficient, but it is to the sources of wealth which are already patent that the country must look in any attempt to recover from its present condition, whether it is to be again an independent republic or a protectorate or province of the Empire of Brazil.

KEITH JOHNSTON.

A TRIP UP THE CONGO OR ZAIRE RIVER.

THE second number of the *Geographical Magazine* (May, 1874), contained a paper entitled "My Parentage and Early Career as a Slave," by my old factotum and companion, "Selim Agha." The public was somewhat startled by the style and tone—in fact, those who noticed the article generally declared that it had been written by a European, and not a few suspected that it was by myself. The editor, who had seen the manuscript, inserted a disclaimer in the June number (p. 120), and there the matter ended.

I here offer a second paper by my *compagnon de voyage*, with a few words of personal notice.

Selim Agha el Tegalli was born in Tegallat, about 1829; the date, of course, is vague, but he was certain that in 1836, when taken to Scotland by my venerable friend, the late Robert Thurburn, H.M.'s Consul for Alexandria, he was a lad about

ten years old. There he learnt to speak English, or rather Scotch, with the true Lowland accent; and he became strongly affected towards Presbyterianism. It has been his fate to wander far and wide over Europe, Asia, Africa, and South America, ever pining for a cottage in Scotland, where he would have accounted himself

“Passing rich on forty pounds a year.”

In 1860 he returned to his natal continent, after volunteering personally to ascertain the facts concerning the murder, in Waday, of Dr. Vögel, attached to the Central African Expedition. The late Sir Roderick Murchison and others were favourable to the plan, but they at length determined that all measures should be left in the hands of the late Dr. Baikie. In 1861 “Selim” became myfactotum, and he accompanied me in many expeditions to the Western Coast, especially to the summit of the unexplored volcano known as the Camarones or Cameroons Mountain, and, as the following paper proves, to the Cataracts of the Congo. When I left Fernando Po, in 1865, he resolved to travel towards the sources of the Niger, and the last letter which he wrote to me was from Liberia.

Selim Agha did not belong to the Guinea Coast, or the Congo people, most familiar to Europe and to the Southern States of North America; he boasted of the old semi-Semitic Abyssinian blood, in former times mixed, doubtless, with that of the half-Arab Bedawin, who still feed their flocks near the western shores of the Red Sea. He thus belonged to what I have called the noble tribes of Africa ranging between, and north of, the Mandengas (Mandingos) of Western, and the Somal of Eastern Ethiopia. The distinction is ignored by the many theorists who do not “approve” of a difference so striking to every traveller. Physically, he was a type of the mixed race. With short curly hair, and coal-black skin, his head and face as far as the nostrils were distinctly Arab; the rest was as clearly African. His thin and sinewy limbs were those of the Berber, whilst the feet and hands suggested the Msawahili. Such are the men who prove how much can be done for the African by good European training, and who, like the “Pundits” lately known to fame, can freely penetrate into the central parts of Nigerland, so dangerous, if not deadly, to white men. And these are the races who, extending southwards, with slow but regular advance, will, after many generations, mix their blood with the tribes typified by the Congo; will spread Islamism through the “Heart of Africa,” and will pave the way for a higher civilization. The process must take time, and mankind is impatient. But it will be effected by the normal method, familiar to all students of history, the higher race impressing its superiority upon the lower; its development will not depend upon the adventitious action of consuls and cruisers, and it will owe nothing to the irregular and spasmodic operation of enthusiasm and philanthropy. It has already cast a ray of light athwart the gloom of the Dark Continent, and the morning will presently dawn with promise of full and perfect day.

And now my factotum shall speak for himself. I leave his manuscript at the office of the *Geographical Magazine*, to prevent all suspicion of its being written by any one but “Selim Agha.”

RICHARD F. BURTON, F.R.G.S.

BEFORE starting on an exploratory journey into any part of Africa, it is essential that the traveller should be properly equipped and provided with the necessary kit both for the inward and outward man; clothing, blankets, and waterproofs of every description; tea, coffee, and sugar if the latter is desirable; a few bottles of genuine cognac, or some ten-year old Jamaica rum. Well equipped with these necessaries, we started from Fernando Po on the 29th of July for the purpose of ascending the Congo. H.M.S. ‘Torch’ (Captain Smith) took us down to Loango Bay, and there we were transferred to the sloop-of-war ‘Zebra’ (Captain Hoskins), which took us to St. Paul’s, where we boarded the ‘Griffon’ (Captain Perry). This latter vessel took us to the Congo, and forthwith we commenced a start up the river on the 31st of August. The usual mode of ascending the river as far as Embomma is by means of small fore-and-aft schooners, of about 40 tons burden, which are heavily sparred and well supplied with canvas. Our gear was taken by the ‘Griffon’s’ boats to M. Parrat’s factory, and there put on board the French schooner ‘Esperance,’ the native captain of which was a Cabenda man of the name of Frank. We had a fine breeze that afternoon, and the ‘Esperance’ sailed up the river most gallantly. The party on board consisted of Consul Burton, Captain Perry, Mr. Bigley, and M. Pisseaux; a boatswain, four assistant boatswains, captain’s servant, the consul’s steward Selim, four French native soldiers, and a crew of eight men and boys besides the captain. The following morning we breakfasted at a Portuguese factory, and soon after weighed anchor, and sailed up the river, arriving betimes at Porto da Lenha, and anchored opposite the fine commercial residence of Senhor Monteiro.

On the afternoon of Wednesday (2nd of September) we left Porto da Lenha, and proceeded on our journey, passing several villages. During the night we rounded Point Devil, a most dangerous place for navigation. The following day, about noon, we arrived at Embomma, which contains a French factory and several Portuguese establishments. No white man had been living at the French factory for the last fourteen months, as the emigration system had been abolished. Many of the Portuguese had also deserted their factories, allowing them to decay.

Saturday 5th.—The expedition paid a visit to the king of Embomma, and on Sunday we visited Senhor Pereira’s gardens, which were very finely laid out, and contained almost every European vegetable. Leaving Senhor Pereira’s, at 3.50 P.M., we came to a dangerous bend in the river, where the rocks were visible on the surface of the water, and the current so strong that we had great difficulty in pulling against it. In about two hours we reached the entrance to the creek, which leads to the king of Embomma’s village. The reach between this and the Lightning Rock, a little below the European factory, is about 8 miles. At 8.15 we arrived at King Nesalla’s village, and having settled an altercation with the canoe-men, who wanted more pay, we made a fresh start.

Early next morning we stopped, and rested till dawn, starting again at 6.30 A.M. The country is hilly, and the river about three-quarters of a mile wide. After journeying for two hours we halted and breakfasted near the Alecto Rock, so-called from some of the ‘Alecto’s’ men having painted a

white trident on it. At 9.30 we again got under weigh, and soon entered a part of the river where it assumes the appearance of an inland lake, some parts being nearly 2 miles wide. Near the upper end are two islands, the lower of which is very small, and has a single large tree growing upon it, which makes it very picturesque. The scenery here is varied, but principally hilly, the highest of the hills being about 1500 feet above the level of the river. Opposite the tree island we met a native chief in his canoe. He came to levy contributions from us. His people, who were armed with guns and matchlocks, made various warlike gestures, and ordered us to stop. M. Pisseaux, being our guide and adviser, we were compelled to pay one bottle of rum, and a piece of cloth 12 fathoms in length. The grass was dry all over the hills, that close to the water's edge being an exception; and very little animal life was perceptible, consequently the country presented a very barren and desolate appearance. Most of the trees were stunted and leafless, the chief of them being the baobab or monkey-bread tree, the fan-palm or palmyra, a few palm-nut trees, and a species of large spreading tree well scattered over the shores, the leaves of which are of a dark green colour, about the size of the lime leaf, and its fruit a long reddish plum, said to be eaten by monkeys. In the afternoon we arrived at another opening in the river, which extended and widened some 3 or 4 miles to the left, and was apparently hemmed in by a very high range of hills. This was the limit of M. Pisseaux's knowledge of the river, and, to our future sorrow and vexation, we landed in the banza or district of Nokki.

Next day (Tuesday, September 8th) we journeyed into the interior, and found the road excessively irksome and trying; nothing but hills and dales. Passing one or two fields of native beans, we arrived at the village of Kindemba, having crossed two places where water was procurable, the one a running stream, and the other a spring oozing out of the ground close to some rocks. After resting here for a short time we ascended a hill some 600 or 700 feet in height, and came to another village, where we saw something like a large baracoon for slaves, but which turned out to be a fetish house for circumcised boys. Not many minutes' walk from this is the village of Kayé, on entering which all our things were put down, and we were marched off to see his majesty the king of this part of the country. We found him seated in state, dressed up in motley garb of European manufacture, a white shirt with collar turned down, a crimson velvet loin cloth fringed with gold, tied round the waist by means of a belt; a beautifully mounted sheath-knife was stuck in his belt, the handle of which was made of nickel silver, being very showily ornamented with imitation emeralds and ruby garnets. Over all his dress was a beadle's red cloak, and on his head a helmet something resembling those worn by English Life Guardsmen; but it was evidently of French manufacture. The king was very young, apparently not more than twenty years of age, and very shy. When the strangers were seated, one on a chair, and the other two on a covered table, the rest of the courtiers sat down on the ground at a respectful distance both from the strangers and the throne. The king's old father was also there, on the ground before his son. The king's name was Sudikil, and

that of his father, Mavonga. After the interview, Sudikil received his presents, with which he expressed dissatisfaction, and would give us nothing to eat, consequently Captain Perry, with Dean and M. Pisseaux, at once started for the river to return to Embomma. The consul engaged Nchama, a native who spoke African idiomatic Portuguese, to act as interpreter and go-between. Our party when it first started from the river, consisted of fifty-six persons, but as soon as we arrived at Kindemba it began to augment, and on our arrival at Kayé it had reached to 150. We were domiciled in the house of Chico Mpambo, a man who put himself up as a French interpreter, but who really knew nothing whatever of that language.

Early next morning we received a visit from Gidi Mavonga and his son Sudikil, who examined all our travelling gear. After half an hour's palaver everything was handed over to Gidi, who promised to start for the Congo in three days, and in consideration of receiving the said goods, bound himself to take us there, bring us back, and feed us by the way. This arrangement was very good, as it secured the friendship of the old chief, besides preventing him and his people from robbing or poisoning us. This day we received a visit from Tetu Mayella, king of an adjacent village, called Neprat. He was accompanied by about twenty followers, all of whom came to us for the express purpose of getting some rum. After a deal of wrangling, Tetu and party received a bottle of gin, for which he presented us with two fowls. This was a godsend, as the day before we had nothing to eat but a few pieces of dry bread. About the same time a pig was brought and slaughtered with great ceremony. Final arrangements were at last made with Gidi to proceed first to Yellalla, or the Congo cataracts, and afterwards to St. Salvador, or Great Congo City. The direction of the Yellalla cataracts from the village of Kayé is E.N.E., and that of St. Salvador, or Congo, E.S.E.

About noon next day (Thursday, September 10th,) we commenced packing in order to start for Gidi Mavonga's village. The natives of Congo are divided into two classes only, the Mfumo, or freeman, and the Muleque, or slave. The Mfumo marries amongst his own slaves, or, properly speaking, retainers, and the children born to him are in their turn Mfumos, or free men. The word slave is here quite improperly used, for the slave is, in reality, a freer man than the prince himself. Everything the prince possesses, except his wives, is literally at the disposal of the slave. Unquestionably, the slave is the body-guard of the Mfumo, but as regards work he does what he likes, sleeps when he chooses, attends to his own private affairs whenever he pleases, and if his master finds fault with his conduct, the chances are, if his own country is not too far away from the place of his thralldom, he will leave him and make an effort to reach the place that gave him birth.

Gidi Mavonga came next morning to take us to his village, which we reached in half an hour. The only object of interest passed on the way was a palm-tree which the lightning had struck, killing it and tearing up several feet of ground. This was the first time we remember seeing any mischief done by lightning in West Africa. Gidi appeared to be a great worshipper of the native fetish. Mavonga is a conse-

crated country pot, and is placed in a small hut at the entrance to the town, and is supposed to be the presiding genius or patron saint of the place in which it is worshipped. Ibamba or Mzamba is a representation of Diabolus. The natives call him Masjinga, and is a house god, usually keeping guard at the bedside. The one in Gidi's house was a peculiarly droll looking object, about 3 feet in height, with mouth wide open, his under lip hanging down, the upper lip drawn up as if by some strong convulsion, nose flat, and the nostrils very much inflated. His eyes were composed of pieces of looking glass, and a piece was also inserted in his belly, but for what purpose we could not find out. On his head was an English billy-cock hat, and round about his shoulders hung different kinds of medicines, a calabash, and a kind of knife. The face of this wonderful figure was black, red, and white.

About mid-day we were visited by some neighbouring chiefs, all gaily attired as usual. They wore common red night caps on their heads, and this was the only head-dress we ever saw adopted by the men on great occasions, Sudikil's military helmet excepted. The women always go bareheaded. We have often wondered where in the wide universe the whole of our old clothes go to after they are purchased by the Jews in the streets of London. The mystery is solved without much difficulty, for we found kings wearing old second-hand livery vests, with the coronet and crest of a marquis on the button; and princes sporting their figures dressed in old livery coats and marines' jackets of the last century; besides a variety of heterogeneous habiliments, such as old superfine black coats which had been worn threadbare, and pantaloons the seats of which had become quite glazed from long service. All these had been cleaned and turned inside out by the Jews; and although some of the textures would scarcely bear the tug of a common needle and thread, they are all sent out to the West Coast of Africa as bran new garments, love of dress entirely blinding the natives from observing the various defects. After regaling our visitors with palm-wine and a bottle of gin, they went away.

The chief Furano, who was expected from Embomma, arrived next morning (Saturday, September 12th), and we at once started for the Cataracts. After marching for a short time, and passing two or three small villages, we commenced a rapid descent in a N.N.E. direction, and journeying at a rapid pace for about 3 miles we entered the village of Chinsawu, the residence of Prince Nelongo. On arriving at Nelongo's we had to wait half an hour in the verandah of an empty house before we were honoured by the presence of his highness, who intimated his pleasure of seeing us by asserting that unless the same presents were given to him as we gave to Sudikil, it would be impossible for us to pass his place. This was too preposterous, for we only stopped here to breakfast, whereas we were four or five days in the territory of Sudikil. At 11.15 my master arranged some botanical specimens which he had collected on the road, and I cut the letter B. and 1863 on the trunk of a large *Adansonia* or baobab-tree in this village.

We got comfortably housed at Nelongo's village, where we noticed, as we did in other places on the banks and neighbourhood of the Congo, that the children were all afraid of the white man; for when anyone attempted to bring them close to the Consul,

the little brats howled as if Ajax from the infernal regions had got hold of them.

The whole of the next morning (Sunday) was taken up satisfying Nelongo, the native idea of the quantity of goods possessed by the white man being quite fabulous. At noon we again made a start, the sun being very hot, the thermometer standing at 90° in the shade. We made a slight descent into a valley, and then ascended a peculiarly formed hill, from the summit of which we obtained a glorious view of the river, which was seen some 800 feet below us, flowing down rapidly and majestically to the sea; but the utter barrenness of the country in the vicinity of its banks carried away every association of fertility from the mind of the lover of a commixture of all the elements which constitute the four seasons. This view of the country, however, is given at the end of the dry season, when almost every tree is leafless, and the grass is withered.

From this point commenced a decline down hill which baffles description. We had walked on and lost sight of the river, and the second time we sighted it we had not journeyed above a quarter of a mile before we arrived at a part of our road where, without exaggeration, the path, if such it could be called, was only two degrees from the perpendicular, and as slippery as ice, owing to the quantity of loose stones and dry grass that lay everywhere.

The distance from Nelongo to the banks of the river is about 5 miles, and on reaching the water-side we found ourselves exactly at the junction of the Nomposo with the Congo River. The Nomposo, we were informed, extends all the way to St. Salvador, but is not navigable even for canoes. There were some fishermen following their vocation at the mouth of this small river, whose services we brought into requisition to take us across and land us a little above its mouth, but on the banks of the great river. There are two rocky islands in the river, on both of which are some tall green shrubs. On the opposite bank is the Banza Vivi, the best place on the river for any one to land wishing to see the Cataracts of the Banza Nculu. This is generally about the period when the light or dry season rains commence, and which usually last about six weeks or two months, and are a great boon to the natives, who depend on corn for subsistence. Maize or Indian corn can be grown in about forty days. An intelligent farmer, who can command sufficient water, will easily grow three crops a year. Cotton comes to perfection in four months, rice ditto, and cabbages between three and four months; casada—good for starch or arrowroot—from six to nine months; plantains and bananas, once a year; radishes, three weeks to a month; turnips in two months, and lettuces, endive, and carrots, from three to four months. The cultivation of peas is not only a loss of time, but a waste of ground, for they never bear enough in two rows, 12 feet by 4, to make a good plateful.

It is always advisable, in travelling through Africa, to keep guides and interpreters from knowing what you are really possessed of, for they are sure to make some excuse or other to fleece you. This morning (Monday, Sept. 14th.) we had evidence of the foregoing. We had paid our guide everything that was requisite for the road, yet, notwithstanding this, he sent the interpreter to ask us for a piece of fancy cloth, which they knew we had in our possession.

You must grant their request, otherwise you may have to give up your journey, for, ten chances to one, they will leave you. Having crossed the river we waited for Gidi and a few hands that had been left behind. On their arrival we started for Vivi, and reached the village after half-an-hour's march.

The king of Vivi, Nesalla by name, spoke Portuguese, and sent us three bunches of plantains and seven fowls for the expedition. In the afternoon Nesalla came with upwards of one hundred armed men, and commenced a long palaver about our going on to Yellalla. Five or six persons spoke, and the conference lasted an hour. The result was that the cloth we had with us was not enough, and that the princes at Yellalla must get a different piece from that which was before the conference, and no division into two pieces was to be made of it under any consideration whatever. As the whole affair was conducted in a good-humoured manner my master agreed to the terms. In the evening the inhabitants of the village had a dance, which ended in drunkenness and uproar.

Banza Vivi, like all other parts of the country, is entirely free from bush. The inference to be drawn from this fact is that the whole country, at no very remote period, must have been under cultivation. In trade the natives always give full measure; and in filling a jug with palm wine it is always done to overflowing. A circumstance illustrative of this took place whilst we were staying at Senhor Pereira's at Embomma. A bag of ground-nuts was being measured, and the vendor finding that the measure did not overflow, at once ran to the market, and returned with the requisite quantity to make up the quantum.

Early next morning (Tuesday, September the 15th) we started for the Banza Nculu. The scenery along the road was varied and picturesque. The first view we had of the river was from an eminence about a mile from Vivi. Here we had a view of the Congo as it was flowing onwards, and round about in all directions were hills and dales of various sizes, adding a panoramic beauty to the scene, far beyond the conception of an artist's pencil. We had to descend from the summit of this hill, and ascend a second one much higher, from which we again obtained views of the Congo. One, the lower view, appeared like a lake apparently shut in on all sides by hills, the lofty summits of which, stretching far and wide on every side, and some of them peering to the height of above 1000 feet into the heavens, gave the place the appearance of Dr. Johnson's ideal Happy Valley of Rasselas. Proceeding onwards, we ascended a third eminence, but by this time we had entirely lost sight of the river, and our path became more level for a short distance. Stopping to gather some flowers, I lost sight of the last of the carriers, and it was some time before I found them. On entering a small village I espied them surrounded by natives—men, women, and children, all of whom appeared to be highly delighted at the sight of the white men.

We now commenced a gradual descent, but before doing so we obtained an open and extensive view of the valley that lay between us and the Banza Nculu. On descending into the valley, we found the soil a dark clay mould, with fewer stones than that of the country through which we had hitherto passed. It was certainly a fine sight to behold, and the best

addition to the scene was the caravan forming the expedition, now disappearing down a valley, now rising to the top of one of the many hillocks with which the valley abounds. The fertility of the soil may be observed here from the fact of the grass growing to the height of 10 or 12 feet. And here, also, the native beans grow to a greater height than those met with in other parts of the country. In the valley we crossed three streams—all feeders of the big river—and, considering it was the close of the dry season, these streams had a fair supply of water.

We now arrived at the summit of the Banza Nculu Hill, where we had to wait the pleasure of the three kings, who with their interpreters were settling some business. So we had to bivouac under a large tree until their highnesses condescended to grant us an audience. Bearing due south from this tree, and on the left bank of the river, is Palabala, one of the many ways by which a traveller may reach Sundi, above the Congo Rapids, where the river is said to become deep, broad, and navigable.

About two o'clock one of the interpreters was sent to put us into a house. In an hour and a half's time we heard the beating of drum and cone (an instrument similar to the triangle), and on looking out a procession was seen wending its way to our new lodgings. The three ministers of the kings were the principal personages, and had come as ambassadors from their master. After three conferences the moderate sum of 300*l.*, in cloth, beads, and liquor, was demanded, in order to continue our journey to Sundi, a distance of only three days' march.

Our object was to reach Sundi, and from thence try to ascertain the course of the river, and to find out whether its source could be reached by canoes or carriers, but finding the demands of the chiefs beyond our power of compliance, we at once resolved to return. Before doing so, however, we proceeded next day to view the Yellala Rapids, which run E.N.E. and W.S.W., and may be said to be about a mile in length. They are assuredly very grand, although the natives led us to expect something even grander. Some fishermen were busy catching fish up and down the quieter parts of the rapids, while the eagles and cranes were satisfying their hunger in the vicinity of the island of Sanga-Cha-Malemba in the middle of the stream.

All day Gidi Mavonga was very stubborn and irritable, wishing to start at once for Vivi, and return home; but my master having to arrange some botanical specimens, to finish two sketches of this part of the country, and being foot-sore, would not hear of starting.

September the 19th found us again at Gidi's village, paying off all the extra hands who had accompanied us to the rapids; and on the 24th we were once more at Embomma, arriving at Porto da Lenha on the 26th. Next day at 4.15 A.M., we arrived at Point Banana, and at 6 o'clock all our things were landed and comfortably housed in M. Parrat's factory.

SELIM AGHA.

BEKE TESTIMONIAL FUND.—A fund is being collected for the benefit of Mrs. Beke, who for sixteen years assisted her husband, the late Dr. Beke, in his numerous labours for the cause of commerce and civilization, and, let us add, geography. The Committee is formed of men of influence, and we trust its appeal will be liberally responded to. Contributions should be paid to Messrs. Roberts, Lubbock & Co., Lombard Street.

ZANZIBAR.

THE presence in London of the Seyyid Barghash of Zanzibar sufficiently accounts for the map of his dominions which accompanies this number of the *Geographical Magazine*. This map is naturally imperfect, because our knowledge, even of the coast, leaves much to be desired, but, nevertheless, furnishes some information not readily accessible through ordinary atlases, and enables our readers to form an idea of the extent of the territories governed by their guest.

The dominions of the Seyyid of Zanzibar extend from the small coral island of Warsheikh, in latitude $2^{\circ} 30'$ N., to the village of Tungue, to the south of Cape Delgado, where they join those of Portugal. All the islands along this coast, a few small ones excepted, are held by him, but on the mainland his dominion scarcely extends beyond the walls of the towns garrisoned by Arab troops, and many parts of the coast, especially in the Galla and Somali countries, defy his authority altogether. Recently small garrisons have been advanced far into the interior, to Unyan-yembe and Urori, but these, we believe, have lately been withdrawn. Even on Zanzibar Island the rule of the Seyyid is much curtailed by the influence of powerful Arab families, who look upon him merely as the first amongst equals. His authority is absolute only with reference to the non-Arab population not placed under the protection of some European consul. On the mainland he generally shares his sovereignty with the old Suaheli chiefs, who take a share of the customs' receipts, and exercise the authority generally associated with government. The coast tribes, though they may own allegiance to the Seyyid, nevertheless pay tribute only to some negro potentate, who is close at hand, and better able to protect or punish them. This precarious position of the Seyyid, with reference to a large portion of the territory nominally under his sway, sufficiently explains the difficulties with which he will have to contend in order effectually to suppress the slave trade.

Our knowledge of the population and area of the Seyyid's dominions is exceedingly scanty. The three large islands, Zanzibar, Pemba and Mafia, have an area of 630, 227, and 200 square miles respectively, and the population of the former is variously estimated between 100,000 and 380,000 souls.

The country is capable of supplying all kinds of tropical produce, including cloves, sugar, cocoa, coffee, nutmegs, cinnamon, guinea pepper, sesame, indigo, cotton, copal, and ivory, but comparatively little has been done hitherto to develop its resources, for the slave trade almost entirely monopolized the energies of the trading classes. The treaty signed on the 20th June, 1873, not only abolished the export of slaves to countries but that from the mainland to the foreign islands likewise. It will compel the merchants to seek other investments for their capital, and is almost certain to lead to the establishment of plantations, like that near Kokotoni, which is managed with remarkable success by Captain Fraser, and with the aid of free labour only. Amongst the rivers there are several which might be used as commercial highways. The Juba, though closed by a bar, is navigable for small craft for a considerable distance. The Wami, opposite Zanzibar, is likewise available for purposes of navigation, as is also the Kingani further south; but the most important of all will probably be

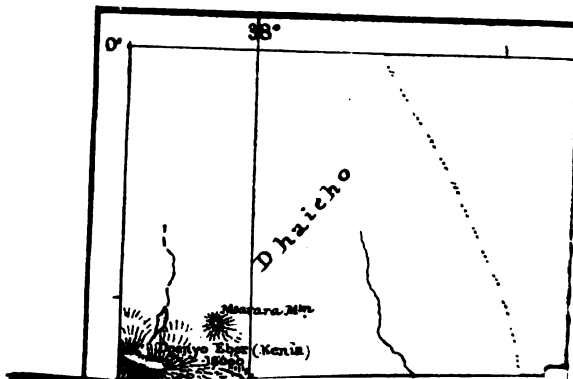
the Lufji or Rufji. This river was first explored by Dr. Roscher (1859), who embarked on the Kikunia Creek, proceeded up the Rufji as far as Niambara, and then descended the Jaja branch to its mouth. In 1872 Captain Wharton and Dr. Kirk ascended the Simba Oranga mouth as far as Fugulia, and returned through the Bemba branch. At the furthest point reached by them, 20 miles above its mouth, the river was 150 yards wide and 6 feet deep, and this was in the dry season. Dr. Kirk is of opinion that a steam launch might ascend for a very long way up in July, before the water has fallen. Captain Elton and Lieutenant Pullen, who crossed the river of Mpenbeno, about 10 miles beyond Dr. Kirk's furthest, found the river 260 yards wide, with a current running about two knots an hour, and averaging $3\frac{1}{2}$, 4, and 5 feet in depth from bank to bank at the driest season of the year. Mr. Stanley who ascended the river subsequently, apparently as far as Mpenbeno, confirms these statements with respect to the Rufji being navigable. The Ruvuma further south, is likewise navigable for a considerable distance as proved by Dr. Kirk's ascent of it.

It is difficult to form an estimate of the trade carried on, as the custom-house returns are very fallacious guides. British India in 1872-3 imported merchandise to the value of 198,516*l.* from Eastern Africa, and exported thither Indian and foreign produce valued at 329,930*l.* From Mombasa there were exported in 1872, to Zanzibar and Bombay, ivory, gum copal, and minor articles to the value of 18,930*l.* The imports amounted to 32,660*l.* A more just conception of the trade may be gathered from the fact that one Indian firm, whose affairs became the subject of judicial investigation, had 434,000*l.* invested in loans and mortgages in Eastern Africa, and Dr. Kirk estimates the Indian capital invested in Zanzibar Island alone at 1,600,000*l.* There is scarcely an estate there, which is not heavily mortgaged to some Indian trader, but a large share of the capital was employed hitherto in fostering the slave trade.

The direct trade between England and Zanzibar has always been inconsiderable, but a large quantity of English goods have found their way thither through the hands of the Banians, who monopolise almost entirely the whole of the trade. Of late years, since the suppression of piracy and the extinction of the Company's monopoly, Indian trade has been restored to something approaching its former importance, and a passage from Eastern Africa to India, which was looked upon formerly as a hazardous enterprise, the success of which was celebrated by public rejoicings, has now become an event of every day occurrence. The number of Indians in Eastern Africa is now steadily on the increase. In 1870 Dr. Kirk estimated their number in the Zanzibar dominions at 3710, but Sir Bartle Frere is of opinion that their aggregate number is much greater, and as few of them have families, they represent in fact a commercial community equal to that of a very considerable town.

Amongst these Indians the Bhattias are probably the most important by wealth and influence, and together with the Banians proper they form the Hindu community on Zanzibar Island. The Muhammadan trading element is represented by Khojas, Mehmoms, and Bohras. All foreign trade passes through the hands of these Indian traders, who collect the African produce for the European and American export houses,

Kenya Mission Station, Lat. S. 6°



and distribute the goods imported by these latter to the natives. Nearly every shopkeeper along the whole of this coast is an Indian. Arriving with little beyond credentials to his fellow countrymen, he soon starts a shop of his own, and after a few years, when he has made a little money, generally returns home to marry, and then comes back to Africa, to repeat, on a larger scale, the same process of money making. Most of them are like birds of passage, and though there are some old-established houses, they are generally represented by men of recent standing.

The Indian trader generally confines himself to the coast, and leaves the Arab, the half-breeds and Suaheli or coastmen, to push into the interior of the country, in search of markets. The journeys of these Muhammadan dealers are sometimes of great extent, and there are cases on record of their having reached Angola, on the West Coast of Africa.

The abolition of the slave trade must naturally work a change in the commercial relations of these countries, and although inseparable from individual hardships, will eventually result to their benefit.*

Reviews.

JAGOR'S PHILIPPINES.†

WE welcome this book as an accession of unquestionable value to the scanty literature of the islands to which it refers. In these days when the reading public finds it hard to keep abreast of the flood of travel books with which it is deluged, it is refreshing to meet one so full of thought as Herr Jagor's work. Although his personal experiences of the country date from fifteen years ago, we cannot regret that their publication has been delayed, for it has afforded him opportunities, of which he has industriously availed himself, of ransacking the archives of the Spanish Colonial Office, and perusing such older works on the Philippines as were to be found in the libraries of Berlin and London.

The Archipelago of the Philippines numbers thirty-one islands of importance, exclusive of numerous tiny islets, rocks, and reefs. They extend from north to south over sixteen degrees of latitude, a circumstance which endows them with a striking variety of climate, which in its turn is exemplified in the growth of products belonging to both the temperate and torrid zones, the palm and the fir, the pine-apple, the potato, and wheat flourishing alike on their shores. The situation of these fertile islands, occupying as they do a central point between Japan, China, Annam, the English and Dutch settlements in the East Indies and Australia, not to speak of their favourable position for communication with the west coast of America, ought

to ensure them a world-wide trade. But hitherto, in spite of the early trade with Manilla in the 16th century, commerce has languished hopelessly through the elaborate and short-sighted restrictions imposed by Spanish protectionists. There is, however, good ground for anticipating better days, for a decree of the 5th of April 1869, provided that the differential duties, which were framed in a spirit of the most extraordinary hostility to all foreign traders, should expire at the end of two years, that all export duties should be abrogated, and that the more annoying port dues should be consolidated into one single charge.

One remarkable peculiarity of this colony is the fact that the Spanish conquerors appear to have taken root in a manner which may be looked for in vain in countries colonized by the Dutch or English. Dr. Jagor quotes a pertinent remark of Bertillon's that the capacity of the Spaniard for acclimatization in tropical countries may be ascribed to the large admixture of Syrian and African blood, which the migrations of the ancient Iberians from Chaldæa across Africa, the colonies of the Phœnicians and Carthaginians in the peninsula, and the invasion of the Moors, successively occasioned. A characteristic want of originality in the native mind causes them to draw the bonds of union closer by their servile imitation of Spanish manners and customs. Nevertheless, the native respect for the superior race is much diminished by the *vaut-riens* which the mother country throws on the hands of her daughter, and who have the bad taste to look down upon the creoles as an inferior caste.

Spanish maladministration is not so novel a subject that anyone should be surprised at an *exposé* of its results in the Philippines. Dr. Jagor observes that in England the higher colonial offices are filled only by those who have given proofs of fitness and ability, but that when a Spaniard succeeds in getting an appointment it is difficult to say whether it is due to merit or to intrigue. After taking into account, however, the fertile crop of troubles brought upon the Indian Government by a certain Presidential Governor, we must supplement Dr. Jagor's dictum with the remark that with England, as with Spain, an official of doubtful capacity is occasionally allowed to cling to office. Still the Spanish Colonial policy is marked by some inexplicable blots. The term of office of their officials is, for fear of their acquiring influence, limited to three years, and this, combined with an excessive red-tapeism, militates against the possibility of instituting many reforms, for, just as the *alcaldes* are beginning to appreciate the capabilities and requirements of a district, they are obliged to leave it.

The most important products of the islands are tobacco, coffee, cacao, cocoa-nut oil, sugar and Manilla hemp. The most notable fact in connection with these is the monopoly of tobacco. The Government appropriated the fields of the peasants without the slightest indemnification—fields which had been brought under cultivation for their necessary means of sustenance—and forced them to raise on the confiscated property an article which required an immense amount of trouble and attention, and which yielded a very uncertain crop; they then valued the harvested leaves arbitrarily and without any appeal, and in some favoured cases paid for them; but this has now apparently not been done for several years in succession, and Spain regularly remains indebted to the poor

* In writing this article we have largely drawn upon *Correspondence respecting Sir Bartle Frere's Mission to the East Coast of Africa, 1872-73*, one of the few really interesting blue books issued within the last few years. Those amongst our readers desirous of obtaining further information respecting Zanzibar, may be referred to Captain Burton's *Zanzibar*, and to the account of Baron von Decken's Expedition.

† *Travels in the Philippines*. By F. Jagor. London (Chapman & Hall), 1875.

peasants in the amount of the miserable pittance from one year's end to another. In addition to this, the Government even rewarded informers, who, after pointing out fields which were already owned but, apparently suitable to the cultivation of tobacco, were actually installed into possession of the proclaimed lands in place of the original owners! It cannot be wondered at, that in the opinion of competent judges the tobacco should, by oppressing the wretched population, seriously interfere with the prosperity of the colony, and yet we learn with surprise that the Government proposes to arrange for extracting a still larger gain from this impolitic source of revenue.

The proximity of the Philippines to the possessions of Russia and America, renders it probable that their future commercial relations will be of an important and extended nature, but Dr. Jagor points out that in the interests of the natives, it is desirable this should not soon become an accomplished fact, because their education and training have not yet fitted them to compete successfully with either of the other two energetic creative and progressive nations.

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JOURNEY ACROSS THE WESTERN INTERIOR OF AUSTRALIA. By *Colonel Peter Egerton Warburton, C. M. G.* 8vo., pp. 308. Map. London (Sampson Low & Co.)

COLONEL EGERTON WARBURTON has missed a splendid opportunity! The adventures through which he passed in the course of his plucky journey across the Australian continent would have furnished other writers with materials for a stirring book of travels and an interesting account of the country. The author of the book before us has thrown away this chance of writing a permanently popular volume, he has disdained even to describe his journey to the Alice Springs, which occupied three months, and hardly says a word about the enthusiastic reception accorded him on his return to civilized life. He is content to print a diary, which he kept during his adventurous journey through the desert, and although this diary is written in the most unpretending style, it will nevertheless be read with interest by thousands, for it records success due to unswerving perseverance. To geographers, as a matter of course, it is altogether indispensable. The introduction on the history of exploration in Australia, by Mr. Ch. H. Eden, is well and carefully written, and the editorship of Mr. W. H. Bates sufficiently guarantees the trustworthiness of the facts stated.

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VESTIGES OF THE MOLTEN GLOBE. By *W. L. Green,* (Minister of Foreign Affairs to the King of the Sandwich Islands. Part I. London (E. Stanford), 1875.

In 1857 the author of this volume published in the *Edinburgh New Philosophical Journal* certain views with respect to the form of the continents, the figure of the earth, and the nature of volcanic action. These views, which, we feel bound to say, are strictly original, he has since developed, and in the volume now before us the figure of the earth is treated of. The author assumes that the solid crust of our earth forms a six-faced tetrahedron with curved faces. The earth's axis of rotation passes through one of the obtuse solid angles of this crystal and through the acute solid angle opposite, the former representing the north pole, the latter the south pole. He then assumes that this solid mass is enveloped by the ocean, which in obedience to the centri-

fugal force of rotation, adopts a spheroidal shape. This ocean covers about three-fourths of the surface of the crystal, the three acute solid angles, which rise above its surface, representing the four continents or quarters of the globe, viz., Europe-Africa, America, Asia-Australia, and the Antarctic continent, whilst the four obtuse solid angles are covered by the four oceans. These views are fully illustrated by diagrams, but we need hardly say that their author has not succeeded in convincing us of their truth. The addition of a cardboard projection of the six-faced tetrahedron, with a map of the globe printed upon it, which could easily be cut out and glued together, would very much facilitate a comprehension of the theories submitted to us by the author.

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ANNUAL RECORD OF SCIENCE AND INDUSTRY FOR 1874. Edited by *Spencer F. Baird.* London (Trübner & Co.), 1875.

THIS work is a very praiseworthy effort to combine in one volume a *résumé* of the chief events during last year in the multifarious branches of science and industry. The idea of such a work is young, having been started in 1871, and it is obvious that the compilation is so big a task that to attain anywhere near completeness in the results would be almost an impossibility. Nevertheless our readers will be surprised to see how much the book does contain; mathematics and astronomy, terrestrial physics and meteorology, physics, geology, geography, and natural history, agriculture and rural economy, domestic economy, mechanics and materia medica, all these subjects have been ransacked to supply facts, and in most cases a reference to the fuller reports is subjoined. Herein constitutes the highest value of the present work, and we trust that the editor and his able staff may be encouraged to persevere in their task, and perfect future issues of so comprehensive and useful a publication.

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DIE DEUTSCHE EXPEDITION AN DER LOANGO-KÜSTE, NEBST ÄLTEREN NACHRICHTEN ÜBER DIE ZU ERFORSCHENDEN LÄNDER. Von *A. Bastian.* 2 vols. 8vo., pp. 750. Jena (Costenoble), 1875. London (Trübner & Co.)

THE origin of the German West African Expedition and the favourable circumstances under which it is able to carry on its labours, are almost wholly the result of Dr. Bastian's persistent advocacy and active support. He had himself visited the Congo coast and San Salvador in 1857, and was therefore enabled to give sound advice with respect to outfit and the selection of the most suitable route for penetrating into the interior. So lively was the interest he took in the success of this enterprise that in 1873 he went himself to the coast of Western Africa, and only started on his return, after a suitable coast station had been fixed upon as a base of supplies, and everything calculated to ensure success had been provided. During this visit Dr. Bastian ascended the Congo River as far as Bomma, explored the coast of Loango to the river Quillo, and made several excursions into the interior of the country. The results of these explorations are now before us, and they will be welcomed all the more as the Loango coast has hitherto been almost a sealed book to us. In addition to a narrative of travels, the author presents us with a topographical description of the coast, an account of the inhabitants, and of the political condition of the country, with linguistic studies and a vast mass of information collected by him with respect to the interior of Southern Africa. Dr. Bastian's book is not only exceedingly instructive, but also highly interesting. His knowledge of various parts of the world, and extensive reading, stand him in good stead when describing the customs of the west African negroes. The introduction of analogous

cases from all quarters of the world, however, leaves rather a hazy expression upon our mind after reading some of his chapters, except it be a confirmation of a conviction that all men are kin, and their manners and customs merely the outcome of the same human nature developing itself under varying conditions.

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NACH DEN VICTORIAFAELLEN DES ZAMBESI. Von *Eduard Mohr*. 2 vols. 8vo. pp. 544. Illustrations. Leipzig (Hirt), 1875.

MR. MOHR has written one of the most attractive books of travel lately issued from the German press. His wanderings certainly have not extended into unknown regions, never before trod by the foot of European, but unlike most of his predecessors, he possesses the gift of calling up in our mind a vivid picture of the scenery through which he passed, and of the people with whom he came into contact. He keeps alive our interest from the moment he sets foot upon one of the German Lloyd's steamers at Bremen until his departure from Africa, and whether in the civilized towns of Natal, in the hunting-grounds first rendered famous by Gordon Cumming, on the farmstead of the stolid boor, in the camp of the gold miner on the Tati, or amongst the native Kafirs and Bechuanas, he proves himself equally a pleasant and instructive companion. It was the love of adventure which primarily led Mr. Mohr to the wilds of Southern Africa, but for all that he has rendered good service to science, by determining in a careful manner the geographical position of a large number of places between the coast and the Victoria Falls on the Zambesi. These positions, and especially his longitudes, have proved of the greatest service in the construction of our maps. And further service to science was rendered by Mr. Mohr by taking with him as a travelling companion a competent geologist, Dr. Hübner. The latter has contributed to this volume a description of the South African diamond fields. The work is well illustrated, and printed in Roman type on good stout paper.

Cartography.

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The Ordnance Survey in 1874.

THE "Report of the progress of the Ordnance Survey to the 31st December, 1874," has just been published by Lieutenant-General Sir Henry James, and bears ample testimony to the satisfactory progress of our great national survey. The work of the 20 officers, 372 non-commissioned officers and men, and 1448 civil-assistants, may appropriately be divided into two sections, viz., that of the survey proper, and that of publication, and in order to obtain a correct idea of the progress actually made, it will be as well to consider each of these sections separately.

Our readers are aware that the survey is carried on now on a scale of 1:2500 (a square inch to the acre), for all the cultivated districts in Great Britain, and of 6 inches to the mile for two uncultivated parts of the country. The whole of Scotland, with the exception of the Orkneys and Shetlands and portions of the western islands has now been surveyed. In England the new survey extends over the six northern counties, Cheshire, Denbigh, Flint, Essex, Kent, Middlesex, Surrey, Sussex, Hampshire, the Isle of Man, and considerable portions of other counties. At the present moment the mineral districts are in progress of being surveyed, and this accounts for the apparent want of order in the conduct of the work, which is still further interfered with by occasional requisitions of the War Office and of certain municipal councils, who, like that of Exeter, are anxious

to have their cities surveyed out of the ordinary course, a desire generally gratified on condition of the council undertaking to pay two-thirds of the cost of the survey. The work in Scotland made less progress during last year than was expected, owing to the amount of rain which fell during the autumn, and which, in the Isle of Skye was 50 per cent. in excess of that of ordinary years. The survey of Ireland on the 6-inch scale was completed some years ago, and is now being revised.

The progress of the surveys during the last three years, and their present state, is shown in the tabular statement which follows:—

	England and Wales. (Including Isle of Man).	Scotland.
Surveyed in 1872	1666 sq. m.	1561 sq. m.
" 1873	1745 "	2118 "
" 1874	1456 "	1029 "
Total up to close of 1874	26,358	28,858
Remain to be surveyed	24,802 "	1837* "

This rate of progress, we feel bound to say, is perfectly satisfactory, bearing in mind the accuracy and care with which the survey is conducted. It will enable the present staff to complete their labours in the course of another ten slow years, not a very long space of time, if we look to the progress made in other countries.

In addition to the above surveys, plans have been made of the following towns, viz., Abingdon, Altrincham, Birkenhead, Chester, Cirencester, Crewe, Eastbourne, Harwich, Merthy-Tydfil, Oswestry, Runcorn and Slough in England; Clonmell and Mullingar in Ireland. The survey of the Scottish towns is completed. In Ireland, where this magnificent national survey is actually used for cadastral and administrative purposes, maps of 246 estates (area 217,228 acres) were made for the Landed Estates Court, 122 glebes (6610 acres) were surveyed for the Irish Church Temporalities Commissioners, and the tenement boundaries were inserted on 417 sheets of the 6-inch map for the Valuation Department. The hills were sketched in the county of Sligo and partially in that of Queenstown.

We now turn to the progress of publication which, we are sorry to say, does not keep pace with that of the survey, as can be seen from the following tabular statement:—

	England and Wales. 1:2500 sq. m.	6-in. map. sq. m.	1:2500 sq. m.	Scotland. 6-in. map. sq. m.
Published in . 1872	970	705	653	1153
" 1873	838	411	518	1154
" 1874	926	418	296	1610
Total published to close of 1874	11,529	16,678	10,908	19,850

Taking the progress made during these three years as our guide, no less than twenty-five years must pass before 6-inch maps for the whole of Great Britain shall have been published, and as the survey will be com-

* These figures differ somewhat from those given in the Report, for Sir Henry James assumes the area of England and Wales (including the Isle of Man) at 58,000 square miles, and that of Scotland at 30,000. According to the Census Returns the area of England and Wales is 50,932 square miles, that of the Isle of Man 227 square miles. The area of Scotland, according to Sir Henry's own figures for the counties, but minus the Orkneys and Shetlands, amounts to 29,760 square miles. The area of the latter is stated, in the Census, to amount to 935 square miles, and the total area for Scotland therefore is 30,695 square miles.

There are other discrepancies in Sir Henry's figures, which we are unable to elucidate. In the Report for 1872 the total area surveyed in England and Wales is stated to amount to 22,693 square miles. If we add to these the area surveyed in 1873 and 1874, as given above, we obtain 25,904 square miles as actually surveyed, instead of the 26,358 given in the Report for 1874, a difference of no less than 454 square miles. On the other hand, the surveyed area of Scotland should amount now to 28,977 square miles. The Reports, which are not by any means conspicuous for a lucid arrangement of facts, afford no clue to these discrepancies.

pleted in the course of ten years, most of these maps will become obsolete before they reach the hands of the public. We are fully able to appreciate the beautiful style in which these maps are being engraved, but are of opinion that this beauty is purchased at too high a price if it causes such unreasonable delay in the publication of the maps. We hear such a deal about photo-zincography and its application to cartographical work of all kinds. Surely, here is an opportunity of utilizing it on a large scale. It is sheer waste of public money to engrave maps on so large a scale on copper, especially as only a few copies of each are required. They would be equally serviceable if produced in photo-zincography, or better still, in photo-lithography, from a carefully drawn original, which could be revised from time to time as new editions are required. The maps would lose somewhat in appearance, but this loss would be more than compensated for by their speedier publication.

Even more provoking is the slow publication of the 1-inch map, which after all, is the one most useful to the general public. The new survey of England and Wales is in a sufficiently advanced state to have rendered possible the publication of 130 sheets of the 1-inch map, of which only 73 have now been published. One of the maps appended to the Report certainly shows 14 more sheets as having been engraved in outline and with names, but they are withheld from the public for some unaccountable reason, and neither figure in the catalogue, nor are they to be procured from the agents charged with the sale of the maps. The case is almost worse with respect to Scotland. According to the Report 78 sheets of the map have been engraved in outline and with names, and there are surveys for 20 more. Yet, up to the beginning of the present year only 55 of these sheets have been issued to the public, whilst 23, though ready to go to press, are withheld. Surely, this cannot be done in order to push the sale of the Parish and 6-inch maps.

In addition to the above there were published in the course of last year, 54 sheets of the 5-feet map of London, and 7 of that on a scale of 1:2500, and plans (on the 10-feet scale) of Andover, Barrow-in-Furness, Brentwood, Canterbury, Hyde, Lewes, Margate, Petworth, Rye, Wick, Athy, Celbridge, Kildare, Maynooth, and Newbridge. A work on the processes and methods adopted for the production of the Ordnance maps is in the press, and as it has been prepared by officers acquainted with the detail of the work, it will no doubt prove of practical value.

The sales, in 1874, realized the paltry sum of 83117., the pay of the persons employed upon the survey, amounted to 111,400., exclusive of the regimental pay of the Royal Engineers.

Reduced Ordnance Maps of Scotland.*

MR. BARTHOLOMEW of Edinburgh is doing good service to tourists by publishing a series of Scotch maps, actually reduced from the Ordnance Survey, and embodying nearly the whole of the information to be found on these latter. The maps of this set now before us are neatly engraved, and embrace some of the favourite tourists' districts. They are without hills, an omission which we regret, though the majority of tourists will probably prefer the maps as they are. Mr. Bartholomew is to be congratulated upon the able manner in which he popularises the results of the Ordnance Survey, and we have no doubt his topographical map of Scotland, when completed, will meet with the reward due to conscientious labour.

E. G. RAVENSTEIN.

* Reduced Ordnance Maps of Scotland. (1) Edinburgh district; (2) Glasgow and Clyde District; (3) Central Perthshire; Perth and Dundee District; (4) Loch Lomond and the Trossacks. By John Bartholomew, F.R.G.S. Scale 2 miles to an inch. Edinburgh (Black), 1875. 2s. 6d., each.

Log Book.

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Captain Allen Young's Arctic Trip.—Captain Allen Young left England on the 26th of June, on a private expedition to the Arctic Seas north of America in the 'Pandora,' a three-masted schooner of 439 tons burthen, with screw steam-engines of 80 nominal horse-power. He will probably follow the track of the 'Alert' and 'Discovery' as far as the Carey Islands, where he will leave letters for the expedition, and then endeavour to penetrate westward through Lancaster Sound. Whether he would follow after that his own former track when serving with Sir Leopold M'Clintock in the 'Fox,' or that of the 'Erebus' and 'Terror,' must depend on the state of the ice. Should the season prove a favourable one it is not impossible that Captain Young may be enabled to coast along the whole northern shore of North America, and emerge by Behring's Straits.

Recent Distinctions conferred on Arctic and other Officers.—We are glad to perceive that the services of Admiral Collinson have been rewarded with the dignity of K.C.B., and those of Captain R. V. Hamilton with that of C.B. Both these officers have done good work in Arctic latitudes. Admiral Collinson entered the navy in 1823. He served in the 'Wellesley' during the first China war, (1841), and was commander of the 'Plover' in piloting operations up the Yangtse River. For his distinguished services in China he was made a C.B. He was Captain of the 'Enterprise' in the Arctic Expedition, *via* Behring's Straits of 1850-55, and during this period he did much valuable exploring work both by navigation and sledging. He received the gold medal of the Royal Geographical Society in 1858 for his Arctic discoveries.

Captain R. V. Hamilton entered the navy in 1843; was mate of the 'Assistance' under Ommaney, in 1850-51; Lieutenant in the 'Resolute' (Kellett) 1852-54, and in both expeditions accomplished much useful sledging work; he afterwards served in the Baltic and in China, and is now Captain Superintendent of Pembroke Dockyard.

Commodore Goodenough, whose valuable report on the Fiji Islands, has been referred to on pp. 85 and 116 of our March and April numbers respectively, has also received, we are glad to see, the twofold distinction of a C.B. and C.M.G.

Professor Nordenskjöld left Tromsö on the 8th of June on board the Norwegian yacht 'Proeven,' Captain Isaksen, an experienced Arctic navigator. Professor Nordenskjöld will proceed to Novaya Zemlya and make an effort to reach the mouth of the Ob or Yenisei, through the Kara Sea. He will then abandon the yacht, and continue his coasting voyage in a boat.

The Geographical Congress at Paris.—This Congress will be opened on the 1st of August, and promises to be a complete success, in as far, at least, as the exhibition of maps and other objects bearing upon geography, however remotely, is concerned. The request of the Government to appoint a Commissioner has excluded private firms from the exhibition; but there will be collections of maps and charts from the Admiralty, the Topographical Depart-

ment of the War Office, and the Indian Survey Office. The Geographical Society will be represented by Sir R. Alcock, one of its vice-Presidents, and will exhibit a collection of its *journals*. Most foreign governments have appointed commissioners and commissions. Thus, Sweden will be represented by Colonel Versteek, Director of Topographical Surveys; M. Stiffe, librarian at Upsala University; Professor Forell, of the Geological Survey; M. Sidenbald, of the Statistical Department; and M. Ruberson, of the Meteorological office. The Netherlands will be represented by Colonel Versteeg, Egypt by Dr. Scweinfurth, &c. The business of the Congress will be transacted in sections, and the meetings are not to extend over ten days. The sections are (1) mathematical geography, geodesy and topography; (2) hydrography and oceanography; (3) physical geography, meteorology, anthropology and geology; (4) historical geography, ethnography and philology; (5) economical geography and statistics; (6) didactic geography; (7) travels. The programme already contains no less than 123 questions to be discussed by these sections. A general meeting will be held daily, in the forenoon. Amongst foreign geographers of note will attend the Congress are Professor H. Kiepert, Dr. O'Peschel, D. A. Petermann, Weyprecht and Payer, Dr. Nachtigall and Dr. Schweinfurth. The Paris Committee have made arrangements with several hotels for a reduction of their ordinary charges and every facility will be afforded to members to inspect the scientific collections and make excursions into the neighbourhood of Paris. Forms of application for membership can be obtained from the Secretary of the Royal Geographical Society or from Baron Reille, 10, Boulevard Latour-Maubourg.

India at the Paris Geographical Congress.—Colonel T. G. Montgomerie, R.E., F.R.S., the Deputy Superintendent of the Great Trigonometrical Survey, has been deputed by the Secretary of State for India to attend the approaching Paris Geographical Congress on behalf of the Indian Survey Departments. He will take with him a carefully assorted selection of the principal lithographed, photozincographed, and engraved maps of the Indian Surveys, and, besides probably taking a prominent part in the Congress itself, he will also be at hand to render explanation on any point concerning the maps under his care. In addition to his great practical knowledge in all the varied operations of the Survey, Colonel Montgomerie has thoroughly identified himself with the geography of the regions lying around the northern frontiers of India, and an exposition of his views on this interesting and important subject will be both authoritative and valuable.

Indian Marine Surveys.—A sketch of the organization, or rather *modus operandi*, for executing this important requirement, has just been drawn up for submission to the Government of India. Captain Taylor, the Superintendent, proposes to undertake coast surveys in the interests of commerce and navigation, the scale being decided on by the Superintendent according to the importance of the survey and the nature of the coast. Where possible the work will be based on the Great Trigonometrical Survey, and this will contribute to the completeness of both surveys. The original surveys of harbours, ports, river entrances, &c.,

will be photozincographed and issued for local navigation and engineering purposes. Being on large scales and sounded sectionally, they will be of great use for reclamation and improvement purposes and such like. From the plans and coast surveys would be compiled charts on a medium scale for general navigating purposes. Copies of all original surveys, except those required for local purposes, will be forwarded to the Admiralty Hydrographer for engraving as that officer may think fit, the Indian Superintendent at the same time furnishing his views for the information of the Admiralty Department. In the surveying operations science will be cared for. Endeavours will be made in the appointment of surgeons on board the vessels to secure the services of officers with scientific acquirements. Dredgings, meteorological observations, and observations on the temperature and currents of the ocean, will be made where opportunity offers; and the desirability of tidal observations will be also borne in mind, so that with the co-operation of Colonel Walker's Trigonometrical Survey Department, we may eventually have an accurate tide-table of the principal ports in India. Tidal streams and currents and all such particulars will also be noted, and this information will subsequently be issued as sailing directions for the Indian coasts. Her Majesty's vessels, and private vessels employed in Indian waters, will also be invited to forward to the office any remarks on discoveries of dangers and errors in charts of Eastern Seas. The officers in charge of the Surveys will report on the lighting and buoys of the coast, inspect the light-houses, see to their proper maintenance, and make suggestions for alterations or for new lights. All changes in beacons and buoys, and notices of new lights, will be at once communicated to the Admiralty Hydrographer. The local authorities will furnish the Marine Survey Department with all information respecting their local navigation, and this information will, after careful comparison with the charts, be printed, issued as a notice to mariners, and widely circulated. A correct list of the light-houses and light-vessels on the coast of India will be published annually, and this in addition to charts and sailing directions, it will be the duty of the Department to supply to the nautical public.

The want of a responsible officer and staff to take charge of all these various important duties has long been felt, and there is little doubt that the usefulness of the new Marine Survey Department will soon be widely and fully recognized by the official and commercial world.

Hadhramaut.—From a pamphlet recently published at Constantinople (*Tarikh i Hadhramaut*, by Reshid), and apparently the Report of some Turkish emissary, we learn that Hadhramaut just now is split up into four distinct sovereignties at enmity with each other. The port of *Makalla* is held by a descendant of the family Kūsadi, whose income is derived from custom's duties. The towns of Kutni and Shibam in the interior as well as the Harbour of Shihr own allegiance to the four sons of Omar, of the Kayuti family and members of the sect of Ismaelites. One of these, Salih, is at present in Haidarabad in India. The Temimi Bedouins exercise authority over the small states in the interior, and a sovereign of the Kūtheiri family holds the remainder of the country, but is cut off from the

sea. The author of the pamphlet considers the latter to be the legitimate sovereign of all Hadhramaut, and tells us that in former times he acknowledged himself vassal of the Porte.

Coal on the Black Sea.—Anthracite having a specified weight of 1.64 has been discovered at Tuapse, a small Russian port, on the north-eastern shore of the Black Sea. This discovery is of the greatest importance to the steamers navigating the Black Sea. The Russian as well as the English company made use hitherto of the anthracite of Donetz, which cost about 18 kopeks a pud (30s. a ton) at Odessa. In future they will be able to procure the superior coal of Tuapse at a more reasonable rate. The Russian Government has resolved to construct a harbour at Tuapse, which will be connected by a branch line with the railway connecting Rostof on the Lower Don and Odessa. This railway will cross the Caucasus through a pass only 2300 feet above the sea level. (*Ausland*).

The Russian Expedition to Hissar.—The object of the Hissar Expedition, which left Tashkend in the middle of April last, is to explore the province of Hissar as far as the Oxus. Hissar is separated from the Russian Zarafshan district only by the valley of Shahr-i-Sebz, and yet it remains entirely unknown. It has been pointed out by M. Sobolef, in a paper published in the *Proceedings* of the Imperial Russian Geographical Society, that there is as great a difference of opinion as to the name of the chief town of Hissar as there is concerning the districts of Kulab, Shugnan, Darwaz, and Wakhai or Wakhan. Colonel Yule considers that Dehi Nau is the chief town of Hissar. M. Sobolef, however, thinks that Dushambe is the most important place. It is with the object of unravelling the knotty geographical points relating to that portion of Central Asia that the Russian Expedition, headed by M. Mayef, the editor of the *Russian Turkistan Gazette*, and accompanied by M. Weinberg, the Russian diplomatic agent in Asia, goes to Hissar. Besides these two gentlemen are M. Schwarz, astronomer, Lieutenants Kriktsof and Vishnefski (who, with M. Weinberg preceded the expedition, going on ahead through Samarkand, Shahr-i-Sebz and Karshi), M. Bakchurin, interpreter, and M. Matusof. The route will lie from Samarkand by a mountain track over the Takhta-Karacha Pass into the Shahr-i-Sebz Valley, and to Karshi, where the members of the expedition were to meet the Amir of Bokhara. Passing from Shahr to Kitab (these are two-walled towns *within one enclosure* in the Shahr-i-Sebz Valley) the expedition will proceed by Yakobak (another fortified town in Shahr-i-Sebz) over the Kalta-Minar Pass and through the Charchak defile into Hissar, reaching Baisun, a town in the latter province. At Baisun and Karshi the expedition is instructed to collect all the information they can obtain relative to the roads leading from Karshi to Baisun through Guzar, as the road is very vaguely and incorrectly traced on all maps. From Baisun the expedition will visit all the chief towns under the Southern slopes of the Hissar Mountains, and from the city of Hissar it will pass to the point where the Surkhhab joins the Oxus. From thence it will endeavour to penetrate to the Kulab, returning to Samarkand through the mountainous country at the sources of the Zarafshan, passing over the Anzob or

some other pass into the valley of the Yagna-ab. The proposed route may be traced on Fedchenko's map published in *Ocean Highways* for August, 1873.

Since writing the above, a telegram has been published stating that the expedition had reached Karshi on the 29th of April, and was received in the most friendly manner by the Amir of Bokhara. The members were about to proceed to Baisun, whence they would visit Kulab and Baljuan.

The Fair of Krasnovodsk.—This fair, which is held annually on the eastern shore of the Caspian, cannot take place this year, for the caravans travelling thither from Khiva and Bokhara have been attacked and plundered by the Teke Turkman.—*St. Petersburg Letter of 18th June.*

Kashmir and Kashgar.—A new work entitled *Kashmir and Kashgar: a Narrative of the Journey of the Embassy to Kashgar in 1873-74*, is now passing through the press, and will shortly be published by Messrs. Trübner and Co. This work, which is from the able pen of Dr. H. W. Bellew, C.S.I., Surgeon-Major, Bengal Staff Corps, who was attached to Sir Douglas Forsyth's party on his recent mission to Kashgar, will doubtless prove of great value to all those interested in Central Asia. We believe the work will be illustrated with a map and photographs of the different peoples met with.

A Railway to Timbuktu.—M. Paul Soleillet started on an expedition from Algiers in December, 1872, his intention being to reach St. Louis, on the Senegal, *via* Timkututu, but owing to the opposition of an insurgent chief, he was unable to proceed further than Insalah, an oasis nearly a thousand miles to the south of Algiers, and fully described by G. Rohlf. In a lecture given at the Salle de Conférences M. Soleillet proposes seriously to construct a railway from Algiers to Timbuktu. He believes that the valuable merchandise from America, destined for southern and eastern Europe, would be forwarded by that route, and thus restore to the Mediterranean the importance necessary to the influence of the Latin races. M. Soleillet is a good patriot, no doubt, but his scheme, though apparently more feasible than the proposition of Mr. Skertchly, to convert the whole of the western Sahara into an inland sea, is not likely to be supported by capitalists.

Exploration of America.—The United States parties for geographical explorations and surveys west of the 100th meridian, under the Engineer Bureau of the War Department, and in immediate charge of Lieutenant George M. Wheeler, United States Engineers, were again to take the field about the end of May, the main points of departure being Puebla, Colorado, and Los Angeles, California. The California division will be under the immediate command of Lieutenant Wheeler, and will be composed of three main parties. The field of operations will embrace portions of Southern and Eastern California, including portions of the coast range and the Southern Sierra Nevada, extending eastward as far as Death Valley, continuing and connecting with the work of former years. The Colorado Division will be under the general control of Lieutenant W. L. Marshall, and will be subdivided into three working parties. The field of operations will be in Central New Mexico and Southern and South-Western Colorado. In addition

to the specific work of the Expedition, special examinations and surveys will be made with a view to determining as to the practicability of diverting the water of the Colorado of the West for irrigation and other purposes. A small party will also act in connection with a similar one sent out under the auspices of the Smithsonian Institution for making archaeological investigations and collections in the Santa Catalina Islands, where it is believed ruins and relics of great interest exist. Although the appropriation made for the work is comparatively small, because of the simplicity of organization and improvements in methods and instruments, it is believed that the operations and valuable results will equal those of former years.

The Paraguay Commission.—Readers of the *Geographical Magazine* may remember that in the end of the year 1873 a commission was appointed by the representative of the Paraguayan Government in London, to examine and report on the resources of Paraguay. This commission consisted of Mr. Twite, geologist; M. Balansa, botanist; and Mr. Keith Johnston, geographer, and reached Asuncion early in 1874. Such, however, was the disturbed and bankrupt state of the country, after several revolutions, that the Government failed to carry out the stipulations of the contracts which had been made. After three months stay, Mr. Twite left the country. Mr. Johnston remained for more than a year, taking advantage of every opportunity that presented itself to travel in the interior during that time. M. Balansa is still, it is believed, in Paraguay, but in a completely destitute condition.

Samoa (Navigator) Islands.—The United States' war-vessel 'Tuscarora,' having on board a diplomatic agent, Colonel Steinberger, arrived at the Samoan Islands on the 27th of March last. The claims made by Americans against the Samoans are now being investigated, and the decision of the court of inquiry will be final. Colonel Steinberger's mission may probably lead to the protection of the United States being extended to the Samoan Islands, which have an area of 1087 square miles, and about 33,000 inhabitants. An account of this island group is to be found in the *Journal des Museum Godeffroy* for 1873, and in Brenchley's *Jottings during the Cruise of H.M.S. 'Curaçoa.'*

W. & A. K. Johnston v. the "Athenæum."—On June 16th the question was discussed of granting a new trial in this case. The Lord Justice Clerk said he thought there was no justification for the high damages given by the jury, amounting to 1275*l.* Lord Neaves thought the amount of damages utterly unjustified by the evidence. In his opinion the sum was outrageous. Mr. Fraser, for the pursuers, said he was in the hands of the court as to the amount of damages which ought to have been awarded in the former trial. The court, therefore, assessed the damages at 100*l.*

Australian Explorations.—Mr. Lewis's expedition to Lake Hope has proved successful. He examined the country between latitudes 25° 35' and 28° 35' S., and longitudes 135° 50' and 139° 30' E., and has been able to fill up a vacant place upon our maps, extending from the overland telegraph line to Sturt's stony desert, and from Lake Hope to Eyre

Creek in Queensland. Before returning Mr. Lewis purposes to search for a route with a view of establishing direct overland communication between South Australia and Queensland. Lake Hope was perfectly dry. Mr. Ernest Giles, who had been exploring the country to the north of Fowler Bay, South Australia, telegraphs:—"Strangway's Springs, April 17, 1875.—Reached civilization again. Had one long stretch of 220 miles without water. All horses died; camels brought us. Love to all. Ernest Giles, Finnis Springs." Strangway's Springs are a telegraph station to the south-west of Lake Eyre; Finnis Springs are to the south of it, likewise on the telegraph line.

Obituary.—We regret to have to announce the death of Mr. Thomas Baines, the great traveller. The deceased accompanied Gregory during his famous north Australian Expedition (1855-6), joined the two Livingstone's on the Zambesi (1858-61), accompanied Mr. Chapman on a journey from the Walvisch Bay to Lake Ngami and the Victoria Falls (1858-68), and visited the Tati Gold Fields on behalf of a mining company established in London (1869). Several papers by him have been published in the *Journal of the Royal Geographical Society*, and jointly with Mr. Lord he is the author of a valued work on "Shifts and Expedients of Camp Life." Numerous sketches by him—he was an artist by profession—are to be seen at the rooms of the Royal Geographical Society.

Correspondence.

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BALASAGHUN, THE CAPITAL OF KARA KHITAI.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In all the recent English maps of Central Asia known to me there is an important error to which I have not seen attention drawn. They all make the river Chu rise in the Issikul Lake. Now, Semenov, who went over this ground with considerable care so long ago as 1857, pointed out that the Chu does not *at present* rise in that lake, but that like the other great lakes, or rather seas, of Central Asia; the Caspian, the Aral, and the Balkash, the Issikul has no outlet. The result of his researches is shown very clearly in the exquisite map of this part of Asia, published in Petermann's *Mittheilungen*, in 1858. The facts shown in that map made the error an excusable one before the district was surveyed, but how it should remain still, even on such excellent maps as that appended to Sir Henry Rawlinson's recent and valuable work, I don't know. The real head waters of the Chu consist of three small streams, named the Shamsi, the Jumgan, and the Karakad, which rise in the Thian-Shan Range, and joining form the Kashkar. This flows in a north-easterly direction towards the Issikul, but according to Semenov (who followed its course), when it gets within 5 versts of that sea, it makes a sudden bend round a projecting ridge, and flows north-westward as the Chu, while a small brook actually flows into and not out of the Issikul from the west.

I said that the Chu does not *at present* flow out of Lake Issikul advisedly. It seems impossible to doubt, if we examine the topography of the district, that the Chu is not the same river that it was once. We cannot doubt, that once it did not lose itself in the steppe lakes of Alzikul, but that it formed, with the Sari-su, a

common river, whose old bed is marked by the broken lakes of Telekul, Kultuk, and Yarmankul, until it eventually fell into the greatly enlarged Aral Lake. At that time we can well believe that the Chu was not the comparatively meagre and shallow river it is shown to be in the itineraries of routes in the Trans-Ili and Chu regions appended to Mr. Michell's work on the Russians in Central Asia, p. 503, &c., while the wastes of Kara Kum would then no doubt present a very different picture. In order that this should be so, the Chu must have received larger supplies of water, and we cannot doubt that the low flat tract that intervenes between it and the Issikul Lake is of recent formation, and that the two ranges of Kangi Alatau and Kirgizin Alatau, which now bound the lake, once formed the watersheds of the river. Semenov was impressed with this fact, and enlarges upon it (Petermann, *op. cit.*, 360). He goes on to tell us that at the east end of the lake, near the *embouchure* of the river Tub, the Buruts point out the ruins of a town now underneath the water half a verst from the shore, and which can only be seen when the water is low, and there is still a legend current among the people there, about a city that once stood at the east end of the lake, but was overwhelmed by the sea. Semenov again tells us that the level of the sea is below that of the river Kashkar. Now, to account for these various facts, I cannot suggest a cause other than that operating elsewhere, and very little studied, namely, that the sea bed has sunk, and in sinking has created a natural dam for the head waters of the former Chu, and that these head-waters, instead of feeding it, now go to form the mighty inland sea of Issikul, and thus constitute it probably the largest lake in the world formed by the mere damming up of water. Whatever the explanation, the inferences suffices for me that the Chu was formerly, and at no very distant date, a much more important river than it is now.

Either upon or in close companionship with the Chu are several important old sites. Thus, Tokmak, which in the pages of the Mongol historian, Ssanang Setzen, gave its name to the khanate of the Golden Horde and Pishpek. Besides, there are some extensive ruins of former cities, as Merke Kurgan or Sary Kodsha, and Sari Kurgan. I propose to identify these last ruins with the site of Balasaghun, the capital of the Gurkhans of Kara Khitai, whose position has been a great deal discussed, but hitherto, I believe, fruitlessly.

The ruins of Sari Kurgan are otherwise known as It-Kichu or It Kiyu (see the maps appended to Sir Henry Rawlinson's *England and Russia in the East*, and to Michell's *Russians in Central Asia*, and the itineraries at the end of the latter work).

I will first draw attention to two almost contemporary itineraries of two travellers who crossed this district in the early part of the 13th century, in opposite directions, and which have been examined with his usual skill and clearness by Colonel Yule. I mean those of Rubruquis, and of the Chinese author who accompanied Khulagui in his march when he invaded the west (*Cathay and the Way Thither*, ccxi., &c.).

"Leaving the Volga on the 16th of September 1253, Rubruquis marched due east through the country of the Kankalis until the 31st of October, when, bearing a good deal south, he passed through certain Alps."

If he went directly east, as he says, his way would lead towards the present Orenburgskoe fort, and if he then turned towards the south, he would cross the Ulu-tau range. Colonel Yule thinks he went more south-east than east, and that the range he crossed was the Kara-tau, but I doubt whether the Karakum Desert would be chosen as the great eastern trade route of that day which was probably the one followed.

"On the 7th of November the travellers entered a plain irrigated like a garden, through which flowed a large river, which entered no sea, but after forming swamps was absorbed by the earth. It flowed from very high mountains they saw towards the south."

If the travellers took the northern route I suggest, the description would then answer very well to the Sari-Su which rises mainly in the Ak-tau mountains, and flows into a swamp.

"On the 8th they entered the city of Kenchac, they went from this east towards the mountains, and a few days later got among the mountain pastures where the Kara Khitai formerly dwelt."

Now, I believe Kenchac to have been situated not far from the Sari-Su, and that the mountain pastures referred to are the lower spurs of the Ak-tau and the Aktarli Mountains, which I believe were essentially the pastures of the Kara Khitai. Colonel Yule places Kenchack in the valley of the Talas, and identifies the Alps referred to with the range separating the Talas and the Chu.

After leaving the mountain pastures of the Kara Khitai Rubruquis and his companions found "a great river which they crossed in a boat; they then turned into a valley, where there were old entrenchments of earth, over which the plough had passed, and came to a good town called Equius where the Muhammadan inhabitants spoke Persian."

Colonel Yule and myself are quite agreed that this river is no other than the Chu, only I would make Rubruquis approach it from the north, and Colonel Yule from the south. The city of Equius, Colonel Yule says, "has been the subject of great difference of opinion;" and he says, "we must locate it north of the Chu somewhere opposite the modern Russian posts of Pishpek and Togmak."

I made a suggestion some time ago that Equius is word for word the It-kiyu of the maps, and in a letter from Colonel Yule, than whom no authority could be more supreme in such matters, he tells me that he is disposed to think that I am right. The situation on the Chu near its upper end, the similarity of name, and the existence of extensive ruins, combine to make the matter very nearly certain. Colonel Yule tells me his only objection is that these ruins are on the wrong side of the river to answer Rubruquis' description, but if, as I contend, Rubruquis took the northern route, and not the southern, the situation of these ruins on the left bank of the Chu, as marked in the better maps, is just in the right place. I have, therefore, no hesitation in identifying the Equius of Rubruquis with the It-kiyu of the maps. From this point onwards the narrative of the travels of the Friar has been made quite clear, thanks to the notes of Colonel Yule.

Let us now turn to the itinerary of the Chinese traveller. It has been translated both by Remusat in his *Nouveaux Melanges Asiatiques*, i., 171, and by Pauthier in his *Marco Polo*. This traveller tells us that four days before he reached the town of Talas, *i.e.* Taras, they passed through Itu a land between two mountains with a peaceable population engaged in trade. Canals meandered about, and were pleasant to the eye. There were many ruins, old walls and ramparts and places there. It was anciently the home of the Kitans. This country of Itu of the Chinese traveller is clearly the country of Equius of Rubruquis who describes it almost in the same terms, and its name is no other again, as I believe, than a corruption of It-kiyu of our maps. Let us now go back a few centuries, and consider the journey of the Buddhist Pilgrim Hiouen Thsang who traversed this region in the earlier half of the seventh century, and more especially the analytical memoir upon his narrative by M. Vivien de St. Martin. M. de St. Martin has shown that the Chinese *li* used as a measure of distance by the pilgrim is not the normal *li* but that 108 of his *lis* answer to 8 French leagues, and that his *li* is equal to 329 metres.

The original journal of Hiouen Thsang says that after travelling 500 *lis* to the north-west of the lake Thsing-tchi (*i.e.* lake Issikul, *vide* St. Martin *op. cit.* 17) he arrived at the town Su-yé-chui. St. Martin adds that the word Chui joined to the name of the town (which is

elsewhere called *Suy-ché* and *Suy-hé*) shows that it was situated on the river of that name, *i.e.* the *Chu*, and it answers exactly, as I believe, to the *It-kiyu* already mentioned. The town of *Su-ché* no longer exists, and neither its name nor its site are mentioned in the very detailed description of the country of *Ili*, and that west of *Lake Issikul* contain the Chinese Imperial geography (*St. Martin op. cit.* 21). This answers exactly to the fact that *It-kiyu* is a mere mass of ruins otherwise known as *Sari Kurgan*, *i.e.* the yellow mounds. I have no hesitation in identifying them as the same place. It will be remembered that *Rubruquis* speaks of *Equius* as a good town. *Hiouen Thsang* similarly speaks of *Su-ye* as a town 6 or 7 *lis* in circuit, and the rendezvous of merchants from different countries. West of *Su-ye* he says there were many isolated towns in each of which were chiefs independent of one another, but all subject to the Turks. After travelling 400 *lis* to the west of the river *Su-ye* he arrived at the thousand sources (in Chinese *Tshien-Tshien* or *Ping-yu*, in Mongul, *Ming-bulak*, in Turk *Bin-gheul*). The country of the thousand sources was about 200 *lis* square. On the south it was bounded by snowy mountains, and on the three other sides by continuous plains. The land was well watered, and the forests were very flourishing. After journeying for 140 to 150 *lis* to the west of the thousand sources, he arrived at the town of *Ta-lo-se*. That is after leaving the *Chu* at *It-kiyu* he travelled westward to the many sources of the river *Karagatai*, which are bounded on the south, as he says, by high mountains, namely, the *Alexandrofsky Range*, and then some 30 miles further to the city of *Taras*, now called *Auliata* on the river *Taras*. The details exactly fit in.

The original journal of *Hiouen Thsang* was supplemented by matter collected by his editors, *Hoeili* and *Yentsong*, from other sources, and these very valuable additions are also translated by *M. Stanislas Julien* in his edition of the work. From them we learn that at *Su-ye* or in its neighbourhood, the travellers met with the Khan of the Turks who was then hunting, about him and the manners and customs of his people he gives some curious details. The Khan sent *Hiouen Thsang* on to his court (neither the name nor situation are given implicitly, but by implication *Su-ye* is clearly meant) where he joined him some days after. After leaving the Khan our traveller proceeded 400 *lis* to the west to the thousand sources, and then on to *Taras* (*Vivien de St. Martin op. cit.* 19). This is all very curious: the Khan of the Turks referred to is a well known potentate, the descendant of the half-mythical *Afrasiab*, the descendant again of *Dizabulus* to whom the ambassadors from *Byzantium* were sent about sixty years before the travels of the Buddhist pilgrims. He was the ancestor also of that dynasty which flourished so much in the 10th century, and known as the *Ilek khans* who ruled from the borders of *Persia* to those of *China*, and it seems clear that *Si-yu* was his capital, at least his southern capital, and that it survived as a flourishing town down to the 13th century. Having settled these facts let us now turn to the founder of the empire of *Kara Khitai*. His name was *Yeliu Taishi*, and his origins are given in some detail in the extracts made from the Chinese histories by *Visdelou* (*D'Herbelot's Bibliothéque Orientale* iv., 28). When the empire of the *Khitans* was overthrown by the *Kin Tartars*, he, an offshoot of the *Khitans* royal family, escaped westwards with only some 200 followers; he passed through the country of the *White Tartars*, where he was well received and entertained (*Visdelou, loc. cit.*). He then went on westward or rather north-westward, and arrived at the city of *Khatun*. I shall continue the story from *Juveni*: he tells us that he arrived on the frontier of the *Kirghises*, who showed a bold front, upon which he moved on towards the country of *Imil*, where he founded a town of which the ruins still remained when *Juveni* wrote (? *Tarbagatai* on the *Emil* which flows into *Lake Alakul*). Several Turkish tribes ranged themselves under his banner, and he presently found himself at the

head of 40,000 families. He then marched towards *Balasagun*, a town which the *Mongols* call *Gu-Balik*. The sovereign of the country was descended from *Afrasiab*. He was no longer powerful, nor could he control the tribes of *Karluks* and *Kankalis* of that part of the country who made attacks upon his territory. Under these circumstances he sent envoys to the great chief who was approaching his country, to invite him to his capital, and offering to surrender the reigns of government into his hands. The *Khitans* prince upon this repaired to *Balasagun*, deprived the descendant of *Afrasiab* of his title of *khan*, leaving him only that of *Ilk Turkan*. He placed governors in all the provinces from *Cum Kidjik* (*i.e.* *Kaptchak*, the western portion of which was called *Kumestan*) to *Burserdjan* (?) and from *Taraz* (*i.e.* *Taras*) to *Tamidz*. All this is very clear, and there is no dispute among writers on the subject. The descendant of *Afrasiab* was no doubt the *khan* of the *Turks*, who had in fact at this time become weak, the princes of *Bishbalig* of *Almalig* and *Kayalik*, formerly his dependents, now being his peers. The city occupied by the conqueror was the Turkish capital which we have shown to have been "the city on the *Chu*," which is probably the literal translation of the *Mongol* name as given above, *Gu-balik*. It is the valley of the *Chu* and its surrounding heights which is specifically called the country of the *Kara Khitai*, and in this valley the only important town known to me at that period and much later was the *Equius* of *Rubruquis*. This site, too, answers admirably to the position of *Balasagun* as required by the narratives of the campaigns of the chiefs of the *Seljuk* and *Khuarezmiyan* empires against *Kara Khitai* as given by *Major Raverty* in his admirable translation of the *Tabakat i Nasiri* published in the *Bibliotheca Indica*. I am convinced, therefore, that the capital of the empire of *Kara Khitai* generally known by the wholly indefinite name of *Balasagun*, which merely means "city," was situated where the ruins of *Sari-Kurgan* on the *Chu* are placed.

I must now acknowledge the courteous letter of *Professor Vámbéry* upon a subject in which he is *facile princeps*, while I am no authority at all. I am pleased that he approves of my *negative* criticism. In regard to the positive one, I thought I was justified in leaning upon such authorities as *Neshri*, himself a native *Ottoman* historian, and *Von Hammer*, but I am convinced that *Dr. Vámbéry's* grammatical objection, which by the way has also been urged by my friend *Dr. Rieu*, is overwhelming. I may add in curious confirmation of *M. Vámbéry's* assertion that the native form of the word is *Turkmen* and not *Turkman*, that the old *Russian* chronicler *Nikon* uses the form *Torkmeni*. Can the terminal *n* be compared with man in *Mussulman* as I believe *Erdmann* suggests?

I am still puzzled, however, by some difficulties. How could *Neshri* a native *Turk* make such a mistake as to create an impossible compound, one contrary to the rules of *Turkish* syntax, and claim it as the etymology of the word *Turkman*? How do we explain again that the name is peculiar to the border-land of the early *Muhammedans*, and first occurs just at the time when the *Turks* were beginning to be converted?

In conclusion, can *M. Vámbéry* help me to the etymology of the *Turkish* tribal name *Karluk* or give me any facts about the *Karluks*. *Von Hammer*, I believe, derives it from the town of *Kayalic*. There is also a well known, and of course an entirely different town called *Karjalik*, south of *Kashgar*. It seems to me that the *Karluks* were the dominant *Turks* of *Kashgar*, and that the *Arslan Khans* of *Kashgar* mentioned by the *Chinese* were represented in the time of *Jingis Khan* by *Arslan Khan* of *Kayalik*, a dependent of the *Gurkhan* of *Kara Khitai*. My letter has become longer than I expected, but the subject teems so much with suggestion that garrulity is perhaps a little excusable.

Yours, &c.,

HENRY H. HOWORTH.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of May 24th, 1875.

THE PRESIDENT'S ADDRESS.

THE anniversary meeting was held under the presidency of Sir Henry Rawlinson, K.C.B., F.R.S., at 1 P.M., at Burlington House. There was a crowded meeting, amongst those present being Count von Beust, Sir Bartle Frere, Sir George Bowen, &c.

The report of the Council was read by Mr. CLEMENTS MARKHAM, which stated that during the past year 294 ordinary members and one honorary corresponding member had been elected, bringing the total number of members to 2969.

The medals and prizes were awarded this year as follows:—The Founder's Medal to Lieutenant Weyprecht of the Austrian Navy, for the enterprise and ability he has displayed in the command of two exhibitions to the sea between Spitzbergen and Novaya Zemlya; for his discovery of new lands in the same sea; and for the many valuable scientific observations made during his voyages. The Patron's Medal to M. Julius Payer, for the great service he has rendered to geography by his explorations and discoveries in the Arctic regions; first, as member of the North German Expedition of 1869-70, in East Greenland, and afterwards, as second in command to Lieutenant Weyprecht, in the two Austrian Expeditions to the Novaya Zemlya Sea of 1871 and 1872-4, during the latter of which he led the sledge party in exploring the coasts of the newly-discovered Franz-Josef Land. Gold watch to Mr. W. H. Johnson, the explorer of the Kuen Lun and Khotan.

Public School Medals were presented as follows:—Gold medal to Henry Alexander Miers (Eton College); bronze medal to Archibald Edward Garrod (Marlborough College). Political geography: Gold medal to Sidney H. B. Saunders (Dulwich College); bronze medal to Wm. C. Graham (Eton College).

Sir HENRY RAWLINSON said that before reading his annual address on the progress of geography he was glad to announce that that day his Royal Highness the Duke of Edinburgh had been nominated to fill the office of Honorary Vice-President, according to his own wish, his Royal Highness intimating that, if requested, he would be glad at any time to take the chair at any of the meetings. In the course of his address the President said that on the 45th anniversary of the Society he was happy to be able to congratulate the Fellows on its increasing prosperity; and if they might judge from the repeated references that were made to the Society on geographical subjects from all parts of the world, their reputation and influence had certainly not diminished. It must indeed be a gratifying reflection to the Fellows of this Society that it was mainly owing to the urgent and persistent arguments impressed by their successive presidents on her Majesty's Government, that the great national undertaking of a Polar Expedition had been at length accomplished. The council, as their representatives, felt proud in having contributed to launch an enterprise which would not only yield the most valuable scientific results, but would redound to the honour of England, and would raise still higher the professional character of British sailors. After referring to the deaths of several well-known travellers, Sir Henry Rawlinson addressed the meeting at length on the subject of the expedition, and briefly referred to the Swedish Expedition which was about to start for the Kara Sea under Professor Nordenskiöld, equipped chiefly through the munificence of M. Oscar Dickson, of Stockholm.

In conclusion, the President said that in encouraging the early study of geography, in fostering merit by honorary reward, in assisting travellers, in supporting expeditions, we do not merely aim at the accumulation of dry details of geographical science, but there are always practical views of sound public benefit underlying our efforts. Exploration, indeed, is the pioneer of progress. Travels in unknown regions lead to the introduction of civilization, the spread of commerce, the friendly intercourse of man with man. Among recent important works tending to improve the condition of mankind, which owe their origin more or less directly to geographical enterprise, we may point to the establishment of telegraphic communication across the Continent of Australia; to the serious efforts now being made for the suppression of the West African slave trade, which are the direct results of Livingstone's travels in Equatorial Africa; to the extension of trade in Central Asia; the colonization of Southern Africa; the opening out of lines of railway communication generally throughout the world. Even in the Arctic expedition, which is about to leave our shores, the high objects of national honour and professional efficiency have been as much considered as the acquisition of technical geographical knowledge.

In the evening the Fellows and their friends dined together at Willis's Rooms.

Meeting of June 14th, 1875.

ARCTIC SLEDGE-TRAVELLING.

THE PRESIDENT, SIR HENRY RAWLINSON, took the chair at 8.30 P.M. The theatre of Burlington House was crowded in every part, and was hung with a large circumpolar chart by Captain J. E. Davis, R.N., of the Hydrographic Office of the Admiralty.

Sir HENRY RAWLINSON said, before proceeding to the usual business of the evening, I take this opportunity of informing the Fellows that an extra meeting will be held this day fortnight in order to make up for that which was deferred in consequence of the sudden death of Admiral Sherard Osborn. At this extra meeting His Highness the Sultan of Zanzibar, who is one of the Honorary Members of the Society, will be present. He was sure His Highness would receive a hearty welcome, for it was mainly owing to his encouragement and support that the Society had been able to send an Expedition from the East Coast to the interior of Africa. Referring to the paper which was about to be read by Sir Leopold M'Clintock "on Arctic Sledge-Travelling," Sir Henry said that the subject was one of peculiar interest at the present time, for Sir Leopold M'Clintock, who is well-known in connection with Arctic exploration, had brought the system of sledge-travelling to such a degree of perfection that it would prove invaluable in the new Arctic Expedition.

Sir LEOPOLD M'CLINTOCK, who was very heartily received, said that whereas all other geographical discoveries were performed either by land or by water, modern Arctic exploration into the higher regions of the frigid zone is prosecuted independently of either, and the ice, which arrests the progress of the ship, forms the highway for the sledge. In early Arctic voyaging, the ship alone was relied upon for penetrating into unknown seas. In the second and third voyages of Parry, and the second voyage of Sir John Ross, between 1821 and 1834, sledging was commenced, and a number of short journeys were made, mainly by the assistance of the Esquimaux, whose methods were closely observed and more or less imitated. But our seamen had not yet familiarised themselves with the idea, that it was quite possible for well-equipped Europeans not only to exist, but to travel in an Arctic climate, as well as the Esquimaux themselves; and it was not until the Franklin Searching Expeditions were sent out, between 1848-54, and thus a motive far stronger than that of geographical

discovery was supplied, that men seriously reflected upon the possibility of any extensive exploration on foot.

Sledge-travelling is limited to the spring months. It cannot be commenced until there is sufficient daylight; it cannot be continued after the summer thaw has denuded the land of snow, or rendered the sea-ice unsafe: therefore it can seldom be prosecuted with advantage before the month of April or later than June.

The late Admiral Sir James Ross, the distinguished Commander of the Antarctic Expedition, who had served with very great credit in all the six voyages of Parry and John Ross, from 1818 to 1834, formed the connecting link between them and the Searching Expeditions which commenced in 1848, and the first of which he commanded. He was acquainted with the flat sledges of the Hudson's Bay territory, which alone can be used in deep snow, gliding as they do over its surface; he was also acquainted with the Greenland dog-sledge, with its high narrow runners shod with ivory or bone, and which cut down through the usually thin layer of snow, and run upon the ice beneath; he was familiar with the various modifications of these typical forms, which had been used in the Arctic Expeditions of Parry and John Ross. He had, moreover, made several journeys with the natives of Boothia Felix, culminating in his discovery of the Magnetic Pole; and on one of these journeys he was absent from his ship for the *then* unprecedented period of twenty-nine days. It was under his directions that our sledges and tents were made in 1848; and these designs, with comparatively slight modifications, have continued in favour in all subsequent expeditions. Sir Leopold then gave a detailed description of the sledge and tent, and described the mode of travelling in a way which entirely dispelled the supposition that it is merely skating over glassy ice or walking over deep snow on snow-shoes.

Salt-water ice is not so smooth as to be slippery; to skate upon it is very possible, though very fatiguing. But hardly is the sea frozen over, when the snow falls, and remains upon it all the winter. When it first falls, the snow is soft, and perhaps a foot or fifteen inches deep; but it is blown about by every wind, until having become like the finest sand, and hardened under a severe temperature, it consolidates into a covering of a few inches in depth, and becomes so compact, that the sledge-runner does not sink more than an inch or so: its specific gravity is then about half that of water. This expanse of snow is rarely smooth: its surface is broken into ridges or furrows by every strong wind. These ridges are the "Sastrugi" of Admiral Wrangell; and although the inequalities are seldom more than a foot high, they add greatly to the labour of travelling, especially when obliged to cross them at right angles.

As the spring season advances, the old winter snow becomes softened, fresh snow falls, and sledging is made more laborious still, until at length thaw arrives, and it is almost impossible to get along at all; but in a few days the snow dissolves, and fair progress is made over the now flooded ice.

Having accompanied Sir James Ross on his sledge-journey in 1849, I was entrusted with the preparations for sledge-travelling in the second and third Searching Expeditions, under Austin and Belcher; and this method of exploration now became recognised as an important feature of these voyages. The utmost attention was devoted to the travelling equipments, and to the methods adopted by Wrangell and other distinguished Arctic travellers; and the spring parties of the second expedition set out in 1851 on the 15th of April, instead of the 15th of May, as in 1849; and the sledges, carrying forty days' provisions, were dragged with less labour than thirty days' rations had previously occasioned: moreover, the allowance was a much more liberal one. The result was a corresponding increase of work done: one party remaining absent for eighty days, and making a journey of 900 miles. But in 1853 and 1854 the sledge parties of the third searching expedition did still better

service: one party accomplished about 1400 miles in 105 days. Another party, having several depôts along its line of route and favourable circumstances generally, travelled nearly 1350 miles in seventy days.

The first was purely an exploring journey. Melville Island, which is some 50 miles broad, and is of moderate elevation, had to be crossed and recrossed. At the outset, very heavy loads had to be dragged; and ignorance of the direction in which the unknown coast-line might trend, interfered with the deposit of provisions to serve for the return journey; nevertheless, the daily average march was 12 miles. The second was a despatch journey, and it shows how rapidly ground can be got over with a tolerably light sledge, under somewhat favourable circumstances; and it is a feat which the sailor, who is not generally credited with good marching powers, may justly point to with pride: throughout this journey the daily march averaged the astonishing distance of 20 miles.

Sir Leopold then briefly referred to the provisions and clothing found to be most suitable for Arctic travelling, and gave the following graphic description of the starting and progress of sledge-travelling parties.

It was on the morning of the 4th of April that they started from the 'Resolute' and 'Intrepid,' commanded by the late Admiral Sir Henry Kellet and myself, at Melville Island. Out of the 88 individuals composing the crews of both vessels, 71 were away sledging at one time; each separate sledge party consisting of one officer and 6 or 7 men. Each sledge hoists a gay silken banner, emblazoned with some heraldic device, some pointed motto, perhaps the name given to the sledge, or perhaps some mysterious initials, known only to the leader of the small party—a little mystery, however, which only awaits the return home of the Expedition for its satisfactory solution. After mutual cheers, they part upon their lonely and toilsome mission. But, trying as is the work before them, it would be difficult to over-rate the enthusiasm displayed. They have just passed through many months of darkness and confinement on board, spent chiefly in preparation for this great spring effort; nor is the keenest emulation wanting to complete a most impressive and characteristic display. Strong sense of duty, and an equally strong determination to accomplish it—dauntless resolution and indomitable will; that useful compound of stubbornness and endurance which is so eminently British, and to which we Islanders owe so much—certainly our colonies and our commerce, possibly even our existence as a nation.

These lonely little parties, daring and enduring so much, resemble sparks from that great fire which, I venture to say, is not yet extinct in this nation—the ardent love of the most adventurous enterprise. Each officer leads his party, selecting the route, jotting down everything noteworthy in his diary, making a running survey as they advance, and checking his estimated distances by astronomical observations. He is also constantly on the look-out for game. When he can leave these ordinary duties, he takes part in the manual labour of dragging the sledge. Clothed and fed like his men, he is housed, or rather tented, exactly as they are, sharing in all things with them; thus he becomes something more than the leader, or even the head of the party: he is its very pulse. These relations fairly established, he receives, in return, the most implicit confidence and devotion of his people. If he reserves anything for his own private use, it is his spoon; there being, of course, no washing up of mess-traps after meals in frosty weather.

In the extensive sledging operations of the third and last Government Searching Expedition, our entire immunity from severe frost-bites was in strong contrast with the second Expedition, where there were some thirty cases of seriously frost-bitten feet; and this fact affords most satisfactory proof of the greater efficiency of the men's clothing.

Before taking leave of these spring parties, let us glance at them on the march, and notice the amount of

work accomplished by those we have already alluded to.

During the month of April the snow is hard, and favourable for travelling, but the winds are of course still very cold; and if at all fresh, frost-bites are almost constantly playing about the men's faces. Thirst is also a good deal complained of. May differs in being milder: the sun is now constantly up; snow-blindness is more frequent than frost-bites, and, to avoid it as much as possible, the travellers sleep by day, and march by night. Some fresh snow falls, and therefore, although the sledges are lighter, the labour of dragging is scarcely diminished. Between the old frost-bites, the keen winds, and strong sun, all faces are badly blistered; most noses are absolutely raw, and finger-tips quite callous from frequent, though slight, frost-bites. Early in June, a few eider ducks, gulls, and ptarmigan appear. As the month advances, the snow becomes very soft. Soon the thaw bursts forth; the land is rendered impassable by innumerable streamlets; the sea-ice is flooded, and the whole aspect of nature has suddenly changed. Matters now look serious. But frost-bites are things of the past; even snow-blindness is less troublesome, and the abundance of water is an unspeakable relief. Those who have soap are now tempted to use it! This, however, is the season for rheumatic pains, consequent upon the daily march through ice-cold water.

The travellers return with prodigious appetites; they weigh on an average 12 lbs. less than when they set out; they are reduced in strength as well as in flesh, yet they can walk for hours without fatigue; their sight for distant objects is much more keen, and their powers of observation of external objects, such as traces of men or animals, &c., much sharpened by exercise: in fact, they have advanced a stage towards the condition of the North American Indian.

The nine sledge parties employed in the spring of 1853, from the 'Resolute' and 'Intrepid,' accomplished in the aggregate 7000 miles, and discovered and explored about 1800 miles of coast-line. This single spring season's travelling may be taken as a suitable basis for calculating what possible amount of work may be performed by the out-going Arctic Expedition, provided that all the circumstances prove to be somewhat similar.

In the spring operations alluded to, Captain Nares took a share, and played his part well, giving proofs of those high qualities which have since borne such good fruit, and which so amply justify his translation from one very interesting and important command, to another still more important, more difficult, perhaps the most difficult to which a commander could aspire.

In the Government Searching Expeditions we gained no experience of snow-houses, and but little of sledging with dogs, yet that little was sufficient to convince us of their value. For instance, during the spring of 1854 our only team of dogs was kept constantly at work, and, without counting occasional short trips, they accomplished, in sixty days' travelling, 1830 miles, affording an average rate of 30 miles, their sledge on the whole being rather lightly laden. On several occasions they performed the distance of 60 miles between the 'Assistance' and 'North Star,' in from twenty to twenty-four hours.

The Government having finally abandoned the search, Lady Franklin nobly determined to make one more effort, and in 1857 she sent out the little 'Fox,' under my command. As our entire crew numbered only twenty-four souls, the employment of dogs now became a necessity; accordingly twenty-four were embarked. In the spring of 1859 we sent out from the 'Fox' three separate divisions of search, each consisting of six men and six or seven dogs; each division accomplished about 1000 miles of distance, and men and dogs worked harmoniously together for the lengthened period of nearly eighty days.

Dogs are most useful when despatch is required, or when the temperature is so low that it is undesirable to

expose more men than is absolutely necessary. Two men, with a good team of a dozen dogs, can travel with astonishing speed; the men securing themselves each night against frost-bite in a small snow-hut or burrow, when they can find a sufficient depth of snow to do so; but this is by no means always the case on sea-ice at a distance from the land. In this manner I made a journey of twenty-five days with fifteen dogs, a driver, and an interpreter. We started on the 17th of February, and accomplished 420 miles; the temperature, which was sometimes as low as -48° , averaged -30° throughout. Snow-huts were built each night, although we were very slow and clumsy masons, requiring an hour and a half, instead of from one half to three-quarters of an hour, to house ourselves. My dog-driver, whose previous experience had taught him what luxuries this mode of travelling was capable of, used to sleep warmly enough, with one dog at his back and another at his feet! An Esquimaux dog is more remarkable for the thickness of his fur than for anything else. He has a broad head and chest, keen scent, and strong dislike to the water. Our largest and best dogs measured 23 inches high at the shoulders, and weighed about 70 lbs. when in fair condition. Two dogs require the same weight of food as one man, and they will draw a man's full load for about one-fourth a greater distance than the man would. If both man and dogs are but lightly laden, the dogs will almost double the distance which the man could do.

All the experience gained in that memorable series of voyages between 1818 and 1859 has been brought to bear upon the equipment of the Expedition of 1875, and it is further intended that dogs and snow-huts should be used to a considerable extent. As on former occasions, so now also, upon the persistency of their efforts in sledging will mainly depend the amount of their success. To sledging we are indebted for almost all our modern Arctic achievements. To it we confidently look, as a means of escape where neither ships nor boats would avail. And here I would ask permission to quote from a paper which I wrote some years ago.—"It is now a comparatively easy matter to start with six or eight men, and six or seven weeks' provisions, and to travel some 600 miles across snowy wastes and frozen seas from which no sustenance can be obtained. There is now no known position, however remote, that a well-equipped crew could not effect their escape from by their own unaided efforts."

I had the great satisfaction of learning from Lieutenant Payer, when he recently visited this country, that these words of mine afforded very great encouragement to him and his companions, when their ship became inextricably beset, and when she was finally abandoned in the 80th parallel of latitude.

To sledging we owe many a thousand miles of coast-line discovered and explored. And, finally, the recovery of the sad, but glorious record of the heroic deeds of Franklin's Expedition. And to sledging we shall owe the principal share of whatever work may be accomplished by the brave men who have now gone out. What their measure of success may be, none dare predict. The public mind, perhaps unaware of the formidable difficulties which surround it, points to the crowning glory of reaching the North Pole—that goal of so much ambition and endeavour. This consummation is possible, and may the high distinction be theirs! But it is only fair to state, that so little practical improvement could be effected in the equipment of travelling parties, that we cannot reasonably expect that the sledging exploits of 1853 and 1854 will be eclipsed by those of 1875.

However, what has been done will be done again, if the state of the ice is at all similar; but of this we are, of course, uncertain. This is a grave uncertainty. We know that an open sea has been found at no great distance off the Siberian coast; and that it rendered nugatory all Wrangell's attempts to sledge northwards.

Yet it is worthy of remark that Wrangell was one of the first, if not the very first person, to suggest an attempt to reach the Pole from Smith Sound.

No reliable indications of a similar state of things to that which he experienced off Siberia has been found anywhere northward of the islands and shores of America. We have occasionally been startled by announcements of open water; but a little further exploration has proved these iceless spaces, or polynias, to be very limited in extent, and solely due to local and apparent causes, such as currents or tides, and they have only been found in straits, and not to seaward of an open coast-line.

Captain Nares has this advantage over Wrangell, that he is provided with boats fit to navigate a partially iceless sea, should his sledging be interrupted by water. Now, we know that the failure of Parry's attempt to reach the North Pole in 1827, was largely due to the great weight of his boats, and the consequent difficulty of dragging them over the ice. This error we have attempted to correct, by supplying boats of considerably less than half the weight of Parry's. But Arctic explorers are well aware that there is one condition which bars all progress: and that is—ice which is too thin to sledge over. Let us hope that our explorers may not meet with any such insuperable difficulty. We know full well that ordinary obstructions will but strengthen their determination to solve the great geographical problem committed to them; and we have the satisfaction of knowing that this national undertaking could not be placed in abler hands. They will carry with them the assurance that they have not only our heartiest wishes for their success, but our entire confidence in their resolute endeavours to deserve it.

Admiral Sir RICHARD COLLINSON said, when the expedition in which he was engaged left England in 1850 they had the advantage of the experience gained up to 1849; but as they did not return until 1853 they could not profit by the improvements made in the intervening years, and were thrown upon their own resources. He started originally from Behring Straits with three dogs, harnessed next to the sledge, with the men in front of them. In the course of the winter they had an addition of three more, which, of course, were not of much use the first year, but in the second and third years were a great help. They became so attached to the ship, that when the ice broke up, and they could not get on board in any other way, they would go round for miles so as to get on the pack on the opposite side, and so reach the vessel. On one occasion, in travelling up the Victoria Strait, he was 13 days absent from the ship, and one night was aroused by the dogs giving tongue. He found the disturbance was caused by the presence of a bear, and the party set off in chase, but were unable to overtake him. When they returned to the sledge, they found that a favourite dog was missing. They waited some time, but at last had to go on without him. In the middle of the next night, however, the dog overtook them. In all probability he had chased the bear, and brought him to bay, and stuck by him, hoping that the party would come up; but eventually had to abandon the bear, and had the sagacity to follow the new track of the sledge instead of that which led back to the ship. When he returned nothing would satisfy him but to enter the tent and salute every one.

Dr. RAE said he had listened with great pleasure to the admirable paper that had been read, but differed from Sir Leopold as to the kind of sledge best adapted for Arctic work. He tried the runner-sledges in 1847, and made a journey of about 600 miles; but for one-half of the distance the sledges could not be used at all, being so rotten, and everything had to be carried. He had brought with him to the meeting a rough sketch of the sledge which he considered best adapted to the work, Flat-bottomed sledges were used in the large lakes, such as Superior, Winnipeg, and Bear Lake; but in the spring those lakes were covered with water, and there-

fore, when a sledge had a load of fine furs, the cargo must be so raised that the water could not reach it. Dr. Rae then described, with the aid of diagrams which he exhibited, the formation of his flat-bottomed sledge. It could not sink, he said, more than an inch or two, for the moment the snow got beyond the runners the whole of the flat body of the sledge rested on the snow. The runners were shod with steel and rounded off, so that the friction was extremely small. He was delighted to hear that the new Expedition would have recourse to snow-houses, which would enable them to reduce the weight on the sledges, there being no tents to carry, and less bedding.

Admiral OMMANNEY expressed his admiration at the able way in which Sir Leopold had treated his subject. He (Sir Leopold) had, however, omitted to mention one of the great feats which he performed in 1851, when he made a journey of 600 miles in eighty days, and settled the question as to whether or not Sir John Franklin had wintered in Melville Island. He himself (Admiral Ommanney) was at the same time away from the ship for sixty days, and they both returned without any reduction in their size and better in health than when they started. Even if Captain Nares only equalled what had been done before, he would explore a great deal of hitherto unknown land. No fear was to be apprehended about the safety of the Expedition; and even if the Pole were not reached, he should be satisfied if Captain Nares came round the north of Greenland and returned to England by the East Coast. No Expedition had ever left this country so perfectly equipped, and no finer sailors had ever visited the Arctic regions.

Admiral RICHARDS said he should very much regret if an impression was allowed to go abroad that the Expedition had not been provided with the right kind of sledges. Due credit must be given to the Hudson Bay gentlemen for the great work they had done, and no doubt they employed the means best adapted to their purposes; but the mode of travelling best suited to higher latitudes was quite different. A sledge party sometimes left the ships for three months at a time, and of course could not carry several different kinds of sledges, even if they wanted them. As to snow-houses, it was utterly impossible to trust to them, for out of a journey of 120 days probably there would be 40 days when no snow could be obtained with which to make huts. They could not very well build snow-houses when travelling knee-deep in water; they were, therefore, obliged to take with them all the materials required for the whole journey.

Sir LEOPOLD M'CLINTOCK, in reply, said Dr. Rae and himself had talked over the details to which Dr. Rae had alluded, twenty years ago, and they were thoroughly acquainted with each other's views. If Dr. Rae had really and sincerely felt that he could have aided the Arctic Expedition by his diagrams and plans, he undoubtedly would have exhibited them before the vessels started. The flat-sledge for raising the cargo a foot or 14 inches higher was a very good makeshift, but nothing more, for travelling where the snow was soft or covered with water; but it would be topheavy, and upset the moment it attempted to move over hummocks. No Government Expedition had ever left this country without being provided with flat sledges, and abundant opportunity had been afforded of testing them, but they had been invariably discarded. He had taken them with him, and had found that when the cargo was on them they rolled over when they came to hummocky ice. Every one could understand that for rough ice it was better to have steel runners, after the fashion of skates. If they trusted to Dr. Rae's flat sledges, and when 300 or 400 miles from the ships the provisions were upset and spoiled, it would be unpleasant, to say the least of it. He himself had travelled nearly 5000 miles with sledges, and nearly 50,000 miles of sledging had been accomplished by the different Arctic Expeditions; there had been great competition among the leaders, each striving to invent something new, and it had been

found that by grouping the men together better work was done than when small sledges, with only one or two men, were used. The longer the sledge the more easily it travelled, on the same principle that a large wheel would run more easily than a small one. Formerly sledges were only 10 feet long, but now they were made 14 feet; and for one description of work, namely, attempting to cross fissures and glaciers, they had 16-foot sledges. It would puzzle even Dr. Rae himself to carry a 20-foot boat to the Pole on a flat sledge; it was necessary to have large and wide sledges. The Arctic Expedition which had just started had sledges of different lengths: 16 feet; 14 feet (in which he hoped the Pole would be reached); 11 feet, to be drawn by seven men, and to do the great bulk of the work; 8 feet, for carrying dispatches, to be drawn by dogs; and 6 feet, or satellite sledges. His object in building these small ones was to enable the naturalists, with very little assistance, to drag their own specimens. He had tried snow-houses in the 'Fox' Expedition, and had made it a part of the exercise during the winter to build them. He found that parties of four men each could hut themselves in about thirty-five minutes, under favourable circumstances; but the farther north the Expedition went, and the further from the shore a party was, the less frequently was snow met with suited for building these houses. A tent to enclose eight men weighed only about 40 lbs., which was a mere trifle. It was Captain Nares' intention to make snow-huts wherever he considered it advisable, and he had been provided with snow-knives and saws, and everything necessary for the purpose. If a *dépôt* were formed, say 100 miles from the ship, a series of snow-huts would be built between the two, so as to obviate the necessity, in such a case, of carrying tents.

In conclusion, the PRESIDENT said these discussions with regard to sledge-travelling were of very great interest, because it was upon sledge-travelling that the success of the new Expedition mainly depended. There was no very determinate scientific advantage to be gained by reaching the Pole, though there was a certain popular sentiment with regard to that object, and no doubt the nation would be very much disappointed if the Pole were not reached. It was evident that if the expeditions which Sir Leopold M'Clintock had described had been directed northwards, instead of east and west, the Pole would have been reached. From the point where Captain Nares hoped to winter in 82° N., it was only 480 geographical miles to the Pole; and at the rate at which Lieutenant Mechem travelled, the journey would only occupy from 25 to 30 days. The great object of the Expedition was to run as far north as possible, and to establish *dépôts* along the route, so that the intervals over which sledge parties would have to carry their own provisions might be as small as possible. If such *dépôts* could be formed halfway between 82° N. and the Pole, there could be no doubt that the remainder of the distance could readily be accomplished. At the same time this was not the essential scientific object in view. All would be very much delighted if the Pole were reached, but even if it were not, there could be but little doubt that many valuable scientific results would be attained, which would be intrinsically of much greater importance.

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FRENCH GEOGRAPHICAL SOCIETY.

December 22nd, 1874.—The fifty-fourth anniversary dinner took place in the "Grand Hotel," Rear-Admiral Baron de la Roncière-le-Noury, President of the Society, in the chair, supported by the Comte de Paris, MM. Paul Mirabaud, Delesse, V. A. Malte-Brun, E. Levasseur, Maunoir, C. Deleamarre, Baron Reille, and others. Toasts were drunk in honour of the President of the Republic, of the President of the Society, of the foreign Geographical Societies, of the Geographical Congress, the fraternal union of all nations, of explorers, geogra-

phical science, commerce and industry, geographical erudition, the memory of Francis Garnier, &c.

January 20th, 1875.—M. Delesse in the chair. The President announced the death of M. d'Avezac, one of the oldest and most active members of the Society, six times its President, fourteen times one of its Vice-Presidents, and lately elected Honorary President for life. M. Brunet de Presle reported favourably on the financial position of the Society. M. Hugo said that concessions had been granted for building railways from Lorenço Marquez (Delagoa Bay) to Pretoria, and from Loando to Asubaca on the Quanza River. Baron d'Avril read letters received from Colonel Gordon, now on the Upper Nile. The Abbé Petitot read a paper on his explorations in the Mackenzie Basin. He considered that the decrease of the native population was due principally to uncleanness and to a disregard of sanitary laws.

February 3rd, 1875.—M. Delesse in the chair. Three letters from M. Henry Duveyrier were read, giving an account of the progress of Captain Roudaire's expedition to the Shotts. The Secretary said that this expedition, consisting of M. Roudaire, Parizot, Martin, Duveyrier, and Dr. Jaquement had left Biskra on the 2nd December, 1874, for the purpose of fully exploring the Shotts of Southern Algeria, with a view to their being converted into an inland sea. The French Government had granted 400*l.* towards its expenses, and the Geographical Society 60*l.*, but further funds would be required if it was to be brought to a successful issue. M. Paul Soleillet then explained his scheme for exploring the Western Sahara. He proposes to travel to Timbuktu by way of Insalah.

February 17th, 1875.—M. Delesse in the chair. The President said that 120*l.* had been granted for completing the spirit levelling to the Shotts of Algeria, and 80*l.* to Dr. Harmand, who was about to visit Further India. Mr. Arthur Russell, on behalf of the Royal Geographical Society of London, expressed the sympathy of that body on the death of M. d'Avezac. A profile of the newly-constructed road between Trebizond and Erzerum, by M. Gilbert, was exhibited to the meeting, and will be published in the *Bulletin*. Two letters from M. Henri Duveyrier were read; they are written from the camp of Muya-el-Tunzi, and refer to the region of the Shotts and the progress made in its exploration. The heights between the Shotts Melghigh and el Rharsa, in the opinion of M. Le Chatelier, the engineer attached to the expedition, would offer considerable obstacles to the creation of a Saharan Sea. M. de Lesseps described the submarine tunnel, by means of which it is proposed to join France and England.

March 3rd, 1875.—M. Delesse in the chair. The President announced that the King of the Belgians had subscribed 40*l.* towards the expenses of the Geographical Congress. M. Hertz said that M. Lagneau had succeeded in reaching Ghadames from Tuggurt, by the route previously followed by M. Dournaux-Dupéré. The Marquis de Compiègne explained his project of a second voyage into Equatorial Africa, and M. Pinart that of an exploration of Alaska.

M. Malte-Brun announced that the Prize Commission of the Society has awarded Gold Medals to the Abbé David, for his travels in Mongolia, and to Dr. Schweinfurth of Riga; and silver medals to the Abbé Petitot, for the information collected by him whilst on the Mackenzie River, and to Messrs. Marche and Compiègne, for their exploration of the Ogowe. The prize founded by the late M. La Roquette for discoveries in the Arctic Regions, had not yet been awarded.

March 17th, 1875.—M. Delesse in the chair. The President announced that the Society had headed a list of subscriptions in support of M. Compiègne's expedition with 40*l.* M. José da Silva Mendes-Léal presented a photograph of Manoel Godinho de Ileredias' letter, in which the discovery of Australia is claimed for the Portuguese. M. Maunoir availed himself of this opportunity to draw attention to the erudite researches of Mr. Major, of the British Museum, according to whom

Australia had been discovered by the French long before 1601. Captain Roudaire, head of the expedition for exploring the Shotts (of which M. H. Duveyrier, Le Chatelier, and others are members), reports on the favourable progress of their labours. A letter from M. Largeau was read, in which that traveller describes the country between Tuggurt and Ghadames. M. Largeau proposes to return to Ghadames with a caravan, and informs the Society that the murderers of M. Douneaux-Dupéré have been executed by order of el Haj Ikhenhukhen. M. A. Germain read a paper on "the first Meridian and the French Nautical Almanack (Connaissance des Temps)," in which he defended that work against the attacks made upon it by M. Struve. MM. Perier and de Chancourtois took part in the discussion, the latter proposing to return to the Meridian of Ptolemy and Mercator, which passed through the island of St. Michael. Dr. Cosson reports on the acclimatation of eucalyptus in Algeria, which has rendered the banks of the Fezzara and other localities perfectly salubrious. The eucalyptus was being rapidly propagated by the colonists, and furnished excellent timber. Captain Ney said he had been stationed during three years at the village Ainmokra, on the Fezzara Lake, which was the centre of the iron mines of the Mokta el Hadid, worked by convicts. Formerly this district was exceedingly insalubrious, but since the introduction of the eucalyptus, in 1873, fever had almost entirely disappeared. Dr. Cosson said that the eucalyptus might be cultivated in any part of the world where the temperature did not fall below freezing point, but that plants of some age were able to resist a cold of 4°C. Localities suited to it might be found in the West of France. M. Bionne said that his experiments in the South of France had failed hitherto.

M. Deyrolles exhibited a photographic apparatus for the use of travellers.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

AT the meeting of the 7th (19th) of May, M. P. de Semenof, Vice-President, being in the chair, M. Wilson, the Secretary, read his monthly report, in the course of which he paid tribute to the memory of M. Kovalevsky, who had recently died at Tiflis, and who since 1861 had been the most active member of the Caucasian section of the Society. After enumerating some valuable presents of books and maps which had been made during the past month, the Secretary announced that the levelling expedition in Siberia was equipped and would start in a few days. M. Chekanofsky had set out for the Lower Lena, and the tundras of the Olenek, with the view of completing his previous explorations. The meteorological observations taken at Nukus and Petro-Alexandrovsk on the occasion of the recent Oxus Expedition have been received by the Society, and an article on them has appeared in the second number of the *Bulletin*.

News has been received from M. Miklucho-Maklay, dated Singapore, the 6th of May. He furnishes an account of his travels in the early part of the year in the Malay Peninsula in quest of an aboriginal race of Papuan extraction. The journey lasted two months, and being commenced before the end of the rains proved exceedingly arduous, Maklay having to cross tracts of forest and plain up to his waist in water, and suffering greatly from the attacks of scorpions and other reptiles. The Semangs, as the wild mountaineers are called, are nomads of primitive habits, and appear to be fast disappearing before the encroaching civilization of the Malays and Chinese. In them M. Maklay clearly discerned the existence of a non-Malay type. He proposes shortly to return to Russia, and there to arrange the results of his investigations for publication.

The fifth volume of the *Geographical Memoirs* published by the Society appeared in April, and

contains papers by Prince Klapotkin on the mountain systems of Eastern Siberia, by M. Fritsche on the drainage of Mongolia, by Baron Kaulbars on the Thian-Shan, and by Captain Sosnofsky on his expedition through Northern China to Bulun Tokoi.

M. Veniukof read a letter from M. Mayef, giving details respecting his proposed journey to Bokhara, Shahri-Sebz, and Hissar. An account of this expedition will be found in the Log Book of our present number.

M. Kuznetsof then exhibited a statistical map showing the Lithuanian population of Russia, and designed so as to display the ethnographical features of Lithuania as well as the influence exercised on the language by Russia, Poland, and Germany respectively. The meeting concluded with the announcement of the election of new members.

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BERLIN GEOGRAPHICAL SOCIETY.

February 6th.—Baron Richthofen, President, in the chair. Dr. Bastian reported on the progress of the West African Expedition. The health of the members stationed at Chinchoxo left nothing to be desired, and only Dr. Güssfeldt had suffered from repeated attacks of fever, but always recovered on his return to the coast station. In September last Dr. Güssfeldt ascended the Nyanga River to the narrows of Mongo Nyanga, in the Balombe country, and then ascended the plateau inhabited by the Bayaka. The furthest point reached by him was Intinde, whence blue mountains could be seen in the distance. Preparations for organising a caravan were in progress. The employment of elephants, which had been proposed by Dr. A. Petermann, could not be entertained, not only because of the expense, but likewise because it was uncertain whether the climate and vegetation of Western Africa would agree with them. The African elephant had certainly been employed by the Ptolemeans and Carthaginians in their wars, and although it was most desirable to utilize this animal, this could hardly be done for the present expedition. Dr. Richard Kiepert discussed, "The last journals of David Livingstone."

March 6th.—Baron Richthofen in the chair. The President announced the death of M. d'Avezac in Paris, and of Sir Charles Lyell in London, who had been honorary members of the society, and had rendered eminent service to geographical science. Herr von Boguslavski read a paper on the deep sea soundings and temperature observations made on board the German war steamer 'Gazelle,' Captain von Schleinitz, and alluded incidentally to similar observations made on board the 'Challenger,' the 'Tuscarora' and others. The points touched by the 'Gazelle' are Madeira, the Cape Verd Islands, Monrovia, Ascension, the Congo and Cape Town. The deepest sounding (2825 fathoms) was effected in latitude 24° 24' S., 0° 12' W. of Greenwich. The greatest ascertained depth in the North Atlantic was 2765 fathoms, in latitude 23° 19' N. 23° 21' W., near the track of the 'Challenger' whose results agree remarkably well with those of the German vessel. The Cape Verd Islands rise on a submarine annular plateau. The existence of cold submarine currents, discovered by the 'Lightning' and 'Porcupine' expeditions, is confirmed by the temperature observations of the 'Gazelle.' The arctic and antarctic currents appear to mingle in about latitude 36° N. and longitude 17° to 18° W., and the surface temperature near the equator was found to be lower than either to the north or south of it. From Cape Town the 'Gazelle' proceeded to Kerguelen Land, and is now on her home voyage through Torres Strait and the Pacific.

VIENNA GEOGRAPHICAL SOCIETY.—*January 26th, 1875.* Professor F. V. Hochstetter in the chair. The chairman announced that the Council had appointed

Mr. Julius Payer General Secretary of the Society, an office corresponding to that of the Assistant Secretary of the Royal Geographical Society. The President said that Lieutenant A. Lux, a member of the Society, had proceeded to the West Coast of Africa, in order to join Captain Homeyer's section of the German West African Expedition. This section now included Captain Homeyer of Görlitz, as zoologist, Dr. Soyeaux of Berlin, as botanist, Lieutenant Lux as surveyor, and Baron Pagge of Mecklenburg, as a volunteer. Mr. J. Payer then discussed various schemes of Arctic exploration, and strongly advocated an expedition into the interior of Greenland. Mr. G. Wex then read a paper on the constant decrease of the rivers and springs, and on the means of remedying this evil. We learn from the "Report for 1874," presented at this meeting, that the Society now numbers 605 ordinary members. The income (including a balance of 259*l.*) amounted to 803*l.*, the expenditure to 451*l.* The balance in hand, at the close of 1874, was 352*l.*, in addition to 1356*l.*, the amount of a legacy left to the Society by Heinrich Lamquet.

February 23rd, 1875.—F. von Hochstetter in the chair. Baron Hofmann read letters from the Austrian Consul Hansal, at Khartum, and from Mr. Marno, which report on the progress of Gordon's Nile expedition (see *Geographical Magazine* for April). Dr. Göehlert read a paper on the Bukowina, Dr. O. Gross on the proposed canal between Danube and Oder.

March 23rd.—Mr. A. Steinhauser in the chair. Mr. Julius Payer described the outfit of the English Arctic Expedition; Mr. Kanitz read a paper on the history, ethnography, and cartography of Bulgaria and the Balkan.

April 27th.—Dr. F. von Hochstetter in the chair. The President read two letters received from Mr. Marno. Mr. Rzitha then read a paper on the commercial importance of the Gotthard railway, and Dr. Gintl gave an account of the petroleum region of Galicia.

LEIPZIG GEOGRAPHICAL SOCIETY.—*February 10th.* Dr. R. Andree, V. P., in the chair. Dr. Ebers read a paper on the "Papyros Ebers" discovered by him in Egypt, and now preserved in the Leipzig University Library. This valuable medical treatise is about to be published. A. Goering exhibited water-colour drawings made by him in Venezuela.

Anniversary meeting, *March 17th.* Professor Bruhns, President, in the chair. The Society now numbers 315 ordinary members, and expended 130*l.* in the past year. G. Rohlf's read a paper on the Libyan Oases, and J. Löwenberg on "Lady Geographers and Travellers."

DRESDEN GEOGRAPHICAL SOCIETY.—No less than eight meetings were held in the course of January and February, Prof. Ruge, the president generally taking the chair. There are sections for educational geography and emigration. Amongst the papers read the following are of general interest:—Captain Kröber on a curvimeter; Dr. Meinicke on the Marquesas; H. Ackermann on the German Element in the United States; Dr. A. B. Meyer on travels in the Indian Archipelago and New Guinea; H. Friedemann, on the pronunciation of English geographical names.

MUNICH GEOGRAPHICAL SOCIETY.—*February 12th.* Prof. von Jolly, President, in the chair. Prof. J. Kollman gave an account of the Dohrn's zoological station and of an ascent of Vesuvius.

March 5th.—Dr. L. Graff discussed the results obtained by the "Challenger Expedition."

ANTHROPOLOGICAL INSTITUTE, *22nd June.*—Colonel Lane Fox in the chair. A paper was read "On the Papuans of New Guinea," written and communicated to the Institute by Captain Lawson, author of *Wanderings in New Guinea.* Before the paper was read it was urged upon the Chairman that the credibility of the author ought to be established before a learned Society before the Institution was allowed to become the vehicle of disseminating his writings. This question, however, was overruled by the chair, and the reading of the paper was proceeded with. There was nothing extravagant or remarkable in it, although some of its statements were found to be inconsistent with the authenticated reports of other observers, among which the structure of the native dwellings may be specified. In the discussion which followed the reading of the paper, Professor Rolleston, Mr. Trelawney Saunders, Mr. Charlesworth, and Dr. Bush took part, and all concurred in conclusions unfavourable to the credibility of the author. In the end the Chairman said that it would be premature to return the usual vote of thanks to the author of the paper.

PALESTINE EXPLORATION FUND.—*Annual Meeting June 10th.*—The Archbishop of Canterbury presided. Mr. George Grove, the honorary secretary, read the report, which stated that the season's field work was resumed last October in the hill-country south of Judah. By the last accounts, very nearly the whole of this little-known south country, including Philistia, had been triangulated. Since the last anniversary 1500 square miles had been added to the map. Several important places had been identified, or their previous identification confirmed by Lieutenant Conder, including the hill of Hachilah, the rock of Maon, Zanoah, Aral, Maarath, Chozeba, Beth Zetho, the Levitical city of Debir, the cave of Adullam, the altar of Ed, &c. Two of the most valuable discoveries of the year were due to M. Clement Ganeau, viz., the boundary of Gezer, and the city of Adullam. The total area now surveyed is 4430 square miles, leaving 1500 to be still filled in, to which must be added the reconnaissance of the Negeb, or south country, to complete the survey of Western Palestine. A map of the whole country this side the Jordan will be brought to England in the autumn of 1876, and given to the world a year later, on a scale of one inch to the mile. The total income of the fund last year was 4179*l.* 18*s.* 11*d.* The cost of the expeditions in Palestine had been 3500*l.* and the heavy debt with which the year commenced had already been cleared off. Captain Richard Burton moved a resolution expressing satisfaction at the intelligence of the despatch of a new expedition from America for the exploration of Trans-Jordanic Palestine.

NOTICE.

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THE
GEOGRAPHICAL MAGAZINE.

AUGUST, 1875.

DISCOVERY OF THE COURSE OF THE
CONGO.

AFRICAN discovery is a subject which has had a deep and abiding interest for Englishmen during upwards of a century ; mainly as it would seem on account of the extraordinary difficulties in the way, and of the vastness and supposed richness of the unknown region. To discover the sources of the Nile, the Niger, and the Congo is a task, or rather series of tasks, which has fascinated and interested at least five generations, and has aroused the ambition and called forth the adventurous spirit of a small army of gallant explorers. It was in 1788 that a company of noblemen and men of science formed themselves into an association, with the object of promoting African discovery, and, thanks to their exertions during nearly half a century, most wonderful progress was made. The African Association was the precursor and direct ancestor of the Royal Geographical Society, which has since continued the work, until now there is but one great secret to be disclosed, one hard achievement of the first rank to be done. The whole story of the Nile and its tributaries, which has so long been a subject of discussion, will probably soon be disclosed by Colonel Gordon and his staff. The origin and course of the Niger have also been discovered, and there is an increasing trade on its waters. But a great stream, inferior neither to the Nile or the Niger, flowing through a vast region, of which absolutely nothing is known, remains undiscovered. The exploration of the Congo, the mightiest of the rivers of Africa, is now the most worthy object of an African explorer, and he who succeeds in laying open the hidden secrets of that famous stream will rank second to none in the glorious roll of English travellers. The difficulties however of ascending it from the western side have hitherto proved so great that it is more probable that the first thorough exploration will be made from the eastern side. Our readers are aware that at this present moment Lieutenant Cameron is striving to accomplish this feat, which if it should please Providence to allow him to carry through to its completion, will probably rank as the grandest geographical exploit achieved during the present century.

In anticipation of this brave explorer's return amongst us, the present appears a not inappropriate time to take stock of all that has been done, and of all that is known, touching the mouth and the lower course of the Congo ; and this takes us back to the

stories of Portuguese discovery nearly four hundred years ago. The little hero nation has the undisputed glory of having, by dint of steady perseverance and dogged resolution, explored the whole west coast of Africa and first doubled the Cape of Good Hope. The great merit of the Portuguese is that their efforts were continuous, that the whole grand achievement was not done by one stroke of luck, but that it was built up, as it were, through the labours of many men, all working at one design, advancing step by step, with an intelligible aim which had been carefully thought out before-hand, by their great architect, Prince Henry, who, it should always be remembered, was himself half a Plantagenet. In the erection of a grand edifice of geographical discovery, the Portuguese had a regular working plan, and visible marks whereby progress was measured and recorded. These marks were designed by King João, and consisted of stone pillars, surmounted by a cross, with the royal arms of Portugal sculptured in front, the name of the king and of the discoverer, and the date at the sides. They were called *Padrões*, and one of them marked the discovery of the Congo.

It was taken out from Lisbon, in the year 1484, by a Knight of the King's household named Diego Cam, who passed Cape St. Catherine, the most southern point hitherto reached, and came to the mouth of a great river, on the southern side of which he set up the pillar. Hence the river was named the Rio do Padrão. The natives called it, at its mouth, the Zaire, and it is known to us as the Congo, from forming the northern boundary of that kingdom. Diego Cam ascended the river for a short distance, had very friendly intercourse with the people, and took home four natives, leaving the same number of Portuguese with the King of Congo, as hostages for their return. The kindly relations between the Portuguese and the people of Congo continued for a long time. Diego Cam returned in the following year, with his native friends, and in 1489 Gonzalo Sousa took out a regular embassy, proceeding from the great river to Banza Congo (San Salvador) the residence of the king, who received baptism and built a church. There was a long succession of kings of Congo with Portuguese names, many embassies passed to and fro and between Lisbon and the Banza, and San Salvador became a flourishing city, with a native Christian king, a bishop, and many monks, and a considerable trade. The provinces of the kingdom were demarcated, and their chiefs received the titles of dukes, marquises, and counts. But there is no record of any advance into the

interior, beyond the territory subject to the native king at San Salvador.

After the lapse of a century from the discovery by Diego Cam, we come to the residence in the country of Congo of Duarte Lopez, from 1578 to 1587, whose history of Congo was published in Rome in 1591 by Pigafetta, with maps. Lopez gives the territory an extension of 600 miles inland, which is far beyond the limits of what we now have any geographical knowledge of. But the king, in those days, had a title indicating vast possessions. He was called Dom Alvaro, King of Congo and of Abandos, and of Matama, and of Quizama, and of Angola, and Lord of the river Zaire and of Loango. Lopez tells us, also, of two lakes in the far interior, called Zembre and Aquelunda, from which the great river and its tributaries flow; and it seems likely that intercourse extended farther into the interior in those days, and that geographical knowledge of the unexplored portions was more complete than is the case now.

An Englishman, the first of our Congo explorers, was in the country in the days of Duarte Lopez, and told his tale to old Samuel Purchas. His name was Andrew Battell, and he afterwards became the near neighbour of the author of the *Pilgrimes*, dwelling at Leigh in Essex. Here he recounted the adventures of his early life, how he served under the Portuguese Governor at St. Paul de Loanda, how he marched far into the interior, how he saw a crocodile swallow eight slaves fastened to a chain, and other marvels. From Duarte Lopez and Andrew Battell our ancestors first heard of the wondrous Congo or Zaire. It was truly reported to be of such force that no ship could get in against the current but near the shore; and to prevail against the ocean's saltness threescore miles within the sea, "before the Congo's proud waves yield their full homage, and receive that salt temper, in token of subjection." "Such," exclaims old Purchas, "is the haughty spirit of that stream, which overrunning the low countries as it passeth, and swollen with conceit of daily conquests and daily supplies, which in armies of showers are by the clouds sent to his succour, runs now in a furious rage, thinking even to swallow the ocean, which before he never saw, with his mouth wide gaping, eight and twenty miles, as Lopez affirmeth. But, meeting with a more giant-like enemy, lies lurking under the cliffs to receive his assault, he is swallowed up, yet still foaming with disdain, and filling the air with noise."

Purchas uses quaint language, but his description of the volume of the Congo and of the effects of its discharge is perfectly correct.

Nearly a century after the days of Duarte Lopez and Andrew Battell, we have another historian of the Congo, in the person of a Capuchin Friar, named Giovanni Antonio Cavazzi, who was many years in the country, suffered great hardships, and submitted an elaborate report at Rome in 1668. He tells us of two tributaries of the Congo, namely, the Vambra, rising in the mountains which divide Fungono from Mæno-emugi, the Quango, and the Berbela, which flows through Lake Aquelunda. Cavazzi also describes Banza Congo, or San Salvador, 50 leagues from the sea, as being fortified, having a dozen churches, and a Jesuit's college, a spacious palace for the native kings, a Portuguese town a mile in circuit, and a population of 50,000 souls.

We may gather from these earlier accounts of the Congo that the Portuguese obtained paramount influence from a distance varying from 200 to 300 miles from the sea, that they collected much information respecting the lakes and the courses of the rivers in the far interior; but that the course of the great river was entirely unknown beyond the Falls, and that no European explorer had penetrated far beyond the territory of the native king, whose capital was at Banza Congo. The ideas formed by the Portuguese are shown on the map drawn by Lopez in 1587, which has been reproduced by Mr. Major in his *Life of Prince Henry the Navigator*. He gives the Lake Zembre, agreeing with Tanganyika, whence flows the River Congo, and further west the lake of Aquelunda, which also feeds the Congo. Then there are two lakes on the equator, "the Lake of the Nile," and Lake Colne, agreeing with the Albert and Victoria Nyanzas. In looking at these features of the map of Lopez it is impossible to avoid the conclusion that the information on which it was based, though often misunderstood, was in the main correct, and yet this information was entirely neglected, and was never repeated on subsequent maps until the discoveries of Burton, Speke, and Baker, restored the three lakes to nearly the positions given to them by Duarte Lopez in 1587. Lopez was also the first to insert the country of Monomvezi (or Unyamwezi) between his lake Zembre (Tanganyika) and the east coast, and he also shows the lake Dembea or Tsona of Abyssinia.

When the African Association was founded, and England began to take the place of Portugal as the fatherland of discoverers, the knowledge acquired by Duarte Lopez and Cavazzi was forgotten or unheeded; and ideas respecting African geography were more confused than they had been two centuries before. Rennel had shown, from the difference of levels, that the Niger did not flow into the Nile, Mungo Park had suggested that the Congo was the mouth of the Niger, and a German geographer, named Reichard, had, with more sagacity, made the Niger pour its waters into the Gulf of Benin. There was nothing but conjecture and hypothesis, but at the same time there was a strong feeling in favour of geographical research, in which the Government took the lead, guided by that great man Sir John Barrow, the steady and enlightened promoter of African, as he was of Arctic exploration.

As soon as the war with France was over, Sir John Barrow induced the Admiralty to despatch a naval expedition to explore the Congo. The undertaking was originally grounded on the idea that the Niger and the Congo were identical; but it was thought on general grounds that a river of such magnitude as the Zaire or Congo ought to be examined, and that it was incompatible with the then state of advancement in geographical science that it should be unknown except for a distance of 200 miles from its mouth. If such was the feeling sixty years ago, how much stronger ought it to be now!

Captain Tuckey, an officer who had done good service during the war, but who had lingered for years in a French prison, and whose constitution had been undermined by service in the Red Sea, was selected to command the Congo Expedition. He was instructed that, as the constant flood led to the supposition that one branch of the great river came

from the tropical region north of the equator, he should, in exploring, give the preference to that stream. He was told that another branch probably came from the east, and that a third, rising in a lake called Aquelunda, of which many details are given by early missionaries, flowed from the south and was the least interesting.

Captain Tuckey received command of a steamer called the 'Congo,' with a crew of forty-nine officers and men, including a botanist and zoologist. The expedition reached the mouth of the Congo on July the 5th, 1816, and proceeded up the river in boats to the foot of the Falls of Yellala, the furthest point hitherto reached.

Captain Tuckey found that the importance of the Congo or Zaire, the real name of which he reported to be "Moienzi Enzaddi" (the river that absorbs all others), had not been exaggerated. The mouth, about six degrees south of the equator, has a breadth of 6 miles and a depth in mid-channel of 150 fathoms. Its great volume and the force of its current effectually prevent the formation of a bar. Many miles out at sea, as old Purchas truly says, the water is perfectly fresh and of a dingy red colour. At a distance of 102 miles above its mouth, the river has a depth of 50 fathoms, and at 140 miles the Yellala Falls commence. Unfortunately Tuckey's expedition did not reach the Congo until the best time for travelling, from May to July, was over. The captain himself, accompanied by fifteen of his party and two interpreters from Embomma, where the 'Congo' had been anchored, landed on the north shore on the 14th of August, and came in view of the Falls, where the river was narrowed to a comparative brook, bubbling over a rocky bed, with an island breaking it into two channels. After travelling for about forty miles over a hilly country, the little party reached a place called Inga, near the head of the Falls, and on the 24th they were on the banks of the upper river, where it was 300 yards wide. On the 6th of September they obtained canoes to hold eight people, where the river becomes 4 or 5 miles wide and free from all rocks. The country was barren and bare of trees, but with a few fertile spots; and the hills rose gently from the banks. The river was rising, and the total rise and fall, as marked by the rocks, was 11 feet.

This was their furthest point, about 280 miles from the sea, which they reached on the 9th of September. A glorious prospect was before them—the navigation of a gigantic stream, unobstructed by rocks, and leading them to a great and important discovery. But sickness obliged them to retrace their steps, and death overtaking Captain Tuckey and others, the expedition returned in command of the master, Mr. Fitzmaurice, who executed the survey from the foot of the Falls to Embomma.

No one has since ascended the Falls of the Congo, or again reached the point on that river which Tuckey attained in 1816.

But some remarkable journeys have since been made from the Portuguese settlements on the west coast to some of the rivers which are believed to join the Congo from the south, and between the meridians of 15° and 25° E. In 1802 there were two merchants, of native origin, called Pombeiros, who, starting from Angola, traversed the kingdom of Muata Yanvo (Kabebe), crossing many rivers, visited the

Cazembe's capital, and reached the Portuguese station of Tete on the Zambesi. Between 1843 and 1848, a Portuguese traveller named Graça, followed in the track of the Pombeiros nearly to Kabebe, and in 1849 Ladislaus Magyar, a Hungarian officer, explored part of the course of the Kasabi or Loeki, reaching a place called Ya-quilem, beyond Kabebe, and hearing of a great lake to the north, the Uhanya, probably the same as the reedy lake heard of by Dr. Livingstone, through which the Lualaba flows. Dr. Livingstone, during his memorable journey from St. Paul de Loanda to the mouth of the Zambezi, also crossed some of the feeders of the Kasabi, which he reported as draining a vast area of slave-producing country.

From its mouth to the foot of the Yellala Falls, the river Congo has very frequently been visited. The last expedition, starting from the west coast, was that of Lieutenant Grandy, who was sent out at the sole cost of Mr. Young, of Kelly, to ascend the Congo with supplies, on the chance of Dr. Livingstone adopting that route, and being in need of succour.

An account of this expedition has, however, so recently been given in our columns,* that we will not repeat it. It failed to add materially to our geographical knowledge, but Lieutenant Grandy, nevertheless, deserved great credit, for all he had done had been well and judiciously done. He showed tact and ability as a traveller, combined with resolution and perseverance; and he was just entering upon work of the greatest importance, near the point where Captain Tuckey was obliged to fall back—above all, he was proceeding in a direction which would have brought help to Lieutenant Cameron long before that gallant officer can reach any European settlement; and the two explorers fully expected to meet and mutually assist each other when they left this country.

Lieutenant Grandy has, however, established the best route for a Congo expedition, and the true method of equipment. He calculates the cost of a thoroughly equipped expedition, which would command success by being independent of local carriers, at 4000*l.* But the results would be worth that sum over and over again, by opening to European trade the riches of a country abounding in ivory, copper, and other valuable products. The rainy season is over in the Congo by the 15th of May, and an expedition should have ascended the river to the point of departure at that date. The whole of the outfit should be prepared in this country, and made up in compressed water-tight bales not exceeding 60 lbs. in weight, including cloth and wire for trading; and the porters should all be engaged at Sierra Leone. Grandy's great difficulty was the incessant desertion of native porters. The best route would be up the river to Lucango, and thence by land to San Salvador, for near the banks of the river the country is difficult, and is moreover a perfect nest of chiefs, who, being very keen traders, would raise all manner of difficulties, and require very expensive presents. From San Salvador to the north-east the country is more open, travelling easy, and as there would be no difficulties about carriers, the expedition would make rapid progress. The route would be by way of Makouta to Sundi near the Congo River, and a considerable distance above the point reached by Tuckey.

* See our January number, p. 26.

The cost of the expedition would be 900*l.* for goods, 400*l.* for arms and ammunition, 224*l.* for a pontoon raft, 320*l.* for passages and outfits of two Europeans, 650*l.* for passages of 60 carriers, a head-man and interpreter from Sierra Leone to the Congo, and 1507*l.* for their wages; the total cost of the expedition being 4000*l.*

It is right to give these details, as a Congo Expedition ought to be despatched from this country to meet and succour Lieutenant Cameron, and to secure the full results of his labours; and because the only chance of such a step being taken is through the idea being adopted and carried into execution by private enterprise. There is no Sir John Barrow alive now to coerce the Admiralty into such an undertaking. It must be done by the Chambers of Commerce, and by merchants who are the successors of the promoters of such expeditions in former days, and whose names will live in history for ever. Such an expedition will not only be one of succour, but it will also aid in the discovery of a vast region, which is known to abound in copper and ivory, and many other valuable products. To mention one: the *Adansonia gigantea* or baobab tree. The fibre of its bark yields material for the best paper that can be made; but it is not used owing to the uncertainty of the supply. Manufacturers will not introduce a new product unless the continuance of an adequate supply is well assured, and for obvious reasons. If a demand arose now, there would at once be reckless destruction and consequent failure of supply. But if the trees were properly treated on correct forest principles, the supply would be inexhaustible as well as the demand, for there is a great and increasing need for materials for paper-making. There would be the same results as regards many other products; and with a great navigable river, and easy land routes, such as are described by Lieutenant Grandy, an immense trade would arise throughout the vast region of the Congo Valley.

Another result of a Congo expedition, and of the opening of this region to European commercial enterprise, would be the final limitation of the slave trade. If English explorers, leading the way for English trade, advance from the west coast, they will sooner or later meet the Arab slave-traders, making their way inland from the east coast. At that point the operations of the latter must cease for ever; and thence they will have to recede.

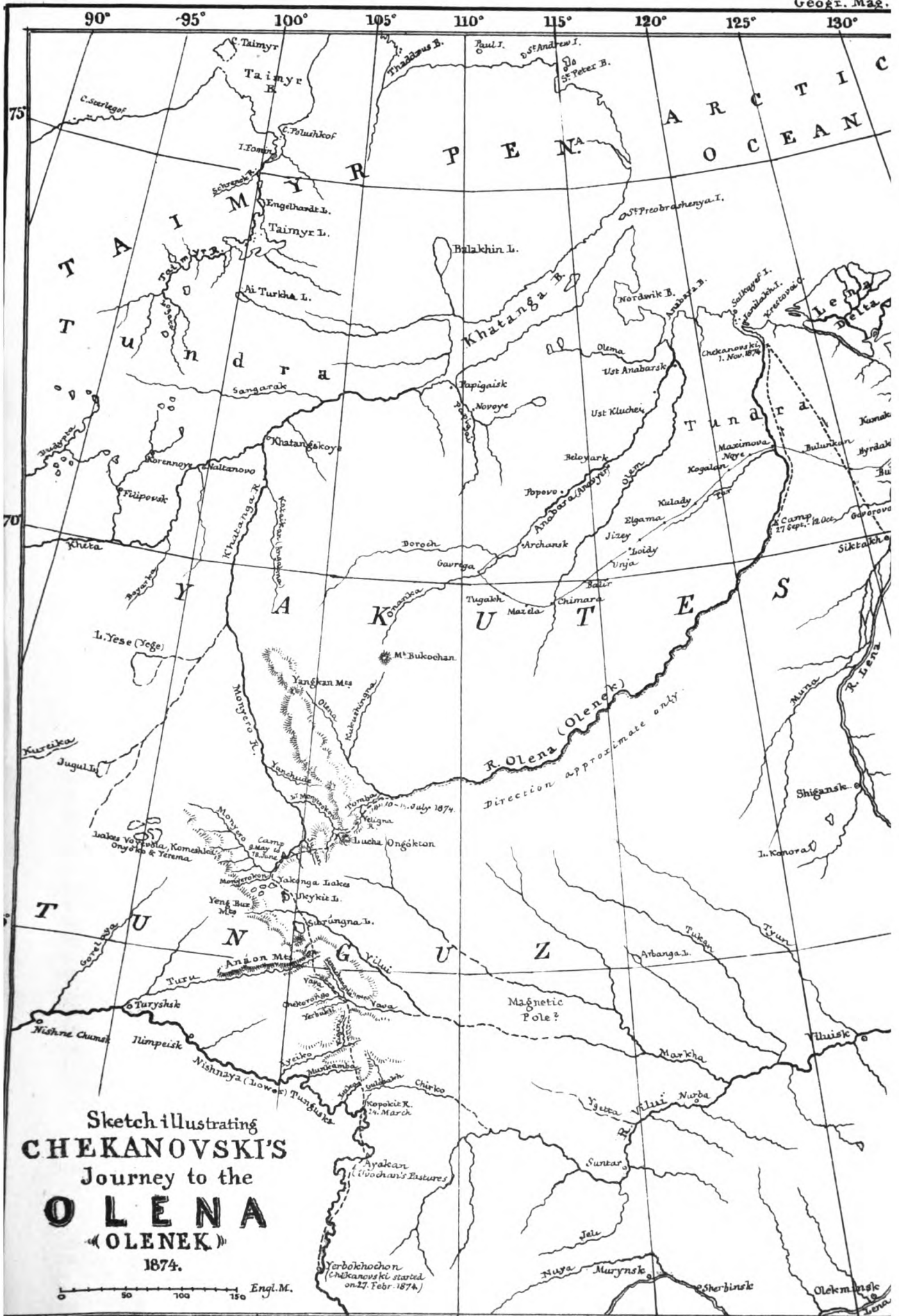
There are then three great and sufficient motives for the despatch of another Congo expedition, the relief and succour of Lieutenant Cameron, who is advancing single-handed, from the east coast; the opening to European commerce of a vast unknown region abounding in rich capabilities; and the final limitation of the operations of the slave trade. This last object will be effected by opening up the Congo to European legitimate trade; and if Cameron should succeed in making an opening for this by connecting Livingstone's furthest point at Nyangwe on the Lualaba, with Tuckey's furthest on the Congo, he will have paved the way for measures of greater efficacy towards crushing the slave trade than any amount of treaties or cruisers.

CLEMENTS R. MARKHAM.

THE OLENA EXPEDITION, 1873—74.*

CHEKANOVSKI and MÜLLER left Irkutsk towards the close of 1873 with a view of penetrating to the sources of the Olena River, and thence to the shores of the Arctic Ocean. They spent a month and a half in making preparations for this extended journey, such as the engagement of servants, the purchase of provisions and stores, and the training of reindeer, and started on the 27th of February from Yerbokhochon, a place on the Lower Tunguska, in latitude 61° 15' N. They travelled in reindeer-sledges, and owing to the deep snow, made but little progress, being obliged to rest frequently in order to recruit the strength of their men and animals, and to repair the unavoidable damage sustained by the sledges. At first they followed the valley of the Nishnáya or Lower Tunguska, only leaving the banks of the river in order to cut off its great windings. On the 24th of March the expedition reached the mouth of the Kopokit (latitude 63° 12'), which it ascended to its source, crossed the head-stream of the Gúlosakh (a tributary of the Chirko) and the Lyuken (a tributary of the Tunguska), and on the 31st of March the Munkamba, and subsequently a narrow mountain-ridge, and rested, on the 3rd of April, at the confluence of Kiginta and Iyeiko (latitude 64° N.). The road up the Kiginta was most troublesome, owing to the great volume of icy water and the large number of springs. Having crossed the waterparting between the Nishnaya Tunguska and the Vilui, Chekanovski entered the valley of the Vava. The general direction, thus far, had been N.W., it became now W.N.W. Two tributaries of the Vava were crossed—the Yerbukli and Chekorongo, after which the road was crossed to the left bank, in order to cut off a large bend of the river, where it is joined by the Senachánna, one of its most important tributaries. On Easter Day the expedition rested below the junction of the head-streams of the Vava, in latitude 64° 46', and on the 18th of April it crossed the waterparting of that river, as well as the Turu, the last affluent of the Nishnaya Tunguska in that direction. On the following day the Anáon Mountains were reached. They rise steeply on the right bank of the Turu, and were crossed on the ice of a small lake which occupies a depression surrounded by precipitous cliffs. On the 21st Chekanovski reached Lake Surúngna, where he found numerous traces of natives, such as store-houses, fishing-tackle, the bark of trees, the sap-wood of which is eaten by the natives, &c., but no inhabitants made their appearance. The road thence led towards the W.N.W., in the direction of the Yakongna Lake, where natives were reported to reside throughout the year. The Vilui was crossed at a place where it is 177 feet wide, but then it became necessary to rest three days, for the guide and several of the men were suffering from inflamed eyes, caused by the glare of the snow. Very soon afterwards a further

* Annual Report of the Russian Geographical Society for 1874, and *Istvestiya X.*, part 2, and *XI.* part 2. M. Albi Kohn thus writes with reference to Chekanovski in the *Glohus* (vol. xxvii.):—"I first made his acquaintance at Alexandrovsk, near Irkutsk, where, like myself, he led the life of a convict. He is a man of high scientific attainments. When 'interned' on Lake Baikal he devoted his time to study and made valuable collections. These latter were lost during the unfortunate revolt of the Polish convicts, in which Chekanovski took no part, and which he was unable to prevent." The dates in this paper are according to the new style.



Sketch illustrating
CHEKANOVSKI'S
 Journey to the
O L E N A
 «OLENEK»
 1874.

rest of four days became necessary on Lake Ukükit (latitude $65^{\circ} 57'$), partly in order to await the passing over of a snow-storm, partly to await the return of the men who had been despatched in all directions in search of natives. On the 2nd of May the expedition at length reached the Yakongna Lakes, the eastern and north-eastern shores of which were skirted.

The Governor-General of Eastern Siberia had instructed the Director of the Vilui District to facilitate the progress of the expedition, and Chekanovski therefore expected that the natives would have been informed of his approach, but found that nothing had been done. On the 21st and 22nd he again sent messengers in all directions, but they returned without success. They frequently found traces of inhabitants, such as sledge-tracks and "Balagans," that is, huts having windows fitted with sheets of ice, a sure sign that the inhabitants spend the cold season here. The next task of the expedition consisted in the search for the Olena. Chekanovski entrusted this task to Golye Kaplin, one of his Tunguzians, who had attended the meeting of his fellow countrymen which was held during the preceding year, at the confluence of Ilimpei and Nishnaya Tunguska, on which occasion he had become acquainted with the Tunguzians from the Surungna Lake, and had collected information respecting the Yakongna Lakes and the Olena. This scout returned after twenty-four hours' absence, and conducted the expedition in a northerly direction over some low hills, when the Monyero, a river 280 feet wide, was reached. This river was traced until it joined a larger one coming from the S.S.W., and having descended the latter during two days, the expedition encamped for the spring in latitude $66^{\circ} 26\frac{1}{2}'$ N., in the firm belief that they had reached the Olena (Olenska).

The guides were not bound to proceed any further, and as no natives had been met with, the success of the expedition would have been endangered if they had not agreed to accompany the expedition to the north, and to remain at the spring camp until the journey should be continued. This willingness alone enabled Chekanovski to continue his explorations, which he could not have done without reindeer or without men to assist him in building a boat to navigate the Olena. These two guides, Peter Golye Kaplin and Peter Uvochan Kaplin, were subsequently rewarded by the Russian Geographical Society by having gala kaftans presented to them. They had supplied the expedition with eighty reindeer besides spare animals, had charge of the whole of the baggage, and furnished the necessary labourers. The expedition thus numbered 2 Russians, (Chekanovski and Müller), 1 Cossack, 15 labourers, and 150 reindeer. If the unavoidable delays at the lakes had not taken place, Chekanovski might have been able to push much further north, which would have been more interesting than his stay at the Monyero, but the reindeer began to calve early on the 28th of April, and this rendered all further progress impossible for the present.

Chekanovski here built a boat, and awaited the breaking up of the ice. On the 18th of June he began his voyage down the river, which was rendered difficult on account of numerous cataracts, but had hardly proceeded 10 versts when he met an old Tunguzian, who informed him that he was navigating

the Monyero, a tributary of the Khatanga, and that the Olena was to be looked for further towards the north-east. This was disheartening news, but the direction of the march was nevertheless changed cheerfully. Two hours' persuasion had to be expended before the old Tunguzian consented to act as guide to the Olena. This Tunguzian was more than ninety years of age, and his reluctance is thus readily explained. He furnished Chekanovski with a considerable amount of geographical information on a district hitherto hardly known at all. He said that the Monyero rose to the north-west of the camp, flowed in a S.W. direction at first, and was joined by the Monyerokan in the vicinity of the Yakongna Lake. It then turned towards the N.W. and finally joined the Kotui. The latter flowed at first not far from the Yenisei, and the springs of the Kapchuk and Num. In its lower course it received tributaries from the Lakes Jugul and Ege (Yese, Shesei) on the left, and from the lakes Voyevoli, Komesha, Onyoko, and Erema from the right. To the east of the latter there was a mountain range, which separated the lakes from the Upper Monyero, and extended south as far as the Yakongna Lake. Several small tributaries of the Monyero, all of which rejoined in the name Monyerokon, had their sources in it. Below the camp the Monyero received two larger tributaries, both from the right, viz., the Lower (Nishnüi) Monyerokon and the Yanchude. The latter rose in the mountains separating Monyero and Olena. These mountains were generally of small height, though they rose above the limit of trees. The highest summits were the Lucha Ongókton, at the junction of the river-basins of Nishnüi Monyerokon, Vilui and Olena, and the Boldono, towards the north-west, the highest of all, in which rose the Yanchude. The Yangkan was still further in that direction, on the Lower Monyero, and gave rise to the Olena. The latter is formed by two head streams, viz., the Kukushingna, which rises in the Bukochan Mountains (which also give rise to the Onamka, the most important head-stream of the Anayver or Anabara) and the Olena Proper, which originates in the Yangkan Mountain.

On the 23rd of June the pack saddles of the reindeer had been arranged, and the expedition started in a north-easterly direction, up an unnamed small tributary of the Monyero, and crossed a mountain saddle into the Jukan Valley. It then crossed the Lucha Ongókton. The summit of these mountains consisted of trap overlying marls, and was not covered with snow. One of the Monyerokans rises here, and not far from it the Veligna, a tributary of the Olena. The latter was traced down to its confluence with the Upper (Verkhnyaya) Tomba. On the 10th of July, that is seventeen days after Chekanovski had left his camp, he reached the mouth of the Tomba and the Olena, in lat. $67^{\circ} 18' N.$ Daily rains had made this journey exceedingly painful, and owing to the bad condition of the pack saddles, it required much care and attention to keep provisions and instruments dry.

On reaching the Olena, the construction of a raft was at once proceeded with, for the time was too short to admit of the building of a boat, and on the 2nd of July 1874, Chekanovski began his voyage down the river. Owing to the low water and numerous sandbanks, progress was very slow. The raft frequently ran aground, and on several occasions a

ditch, some 140 feet in length, had to be dug to liberate it. At first no inhabitants at all were met with, and subsequently only a few families at intervals of 100 versts and more. The expedition was received by them with suspicion, for they had heard nothing about it, and it required much persuasion to gain their confidence. The immense windings of the river very much impeded the rapid progress of the expedition, and contrary winds at length compelled it, on the 27th September, to establish its autumn camp, in lat. $70^{\circ} 28\frac{1}{2}'$ N., close to the habitation of a family of natives. Chekanovski had now reached the Ulus of Chigansk, but here likewise he found that the natives had received no instructions to facilitate his progress. He held an open letter from the Governor-General, which required all Russian subjects to render him aid, and this he forwarded to the nearest Russian Government representatives, but as it was very uncertain whether that letter would reach its destination, he availed himself of an opportunity to purchase six dog-sledges, and having placed upon them the most indispensable provisions and instruments, he started with Müller on the 12th October, by land, leaving the bulk of his baggage at the autumn camp. Our travellers followed the valley of the Olena, but assistance was at hand. Chekanovski's letter had fortunately fallen into the hands of Mr. Ryeshetnikof, who was commandant of Kolymsk during Maydell's expedition amongst the Chukchi (1868-9), and who held scientific expeditions, and particularly those supported by the Russian Geographical Society, in the highest estimation. He lost no time by applying to the Government authorities, but went at once in search of a wealthy Yakut, Peter Achkasof Khatygin, who lived near Siktyakh on the Lena, and induced him to start in quest of the expedition, and thus it happened that Chekanovski and Müller, seven days after they had left their camp, met most welcome assistance in the midst of the wilderness. Achkasof at once placed his own services, and those of his reindeer, at their disposal, and his knowledge of the country enabled them to cross the Tundra in safety, a feat of considerable difficulty so late in the season. On the 1st November they had reached the mouth of the Olena, and thence proceeded to Siktyakh, where the members of the Government board were assembled at that time. They, not desiring to be second to Achkasof in generosity, at once offered to send the expedition beyond the frontiers of their district free of expense.

The shortest road not being available during winter, Chekanovski and his companions first proceeded to Werkhoyansk by a kind of winter stage, and there heard from the district captain that orders had been received in May last to render him every assistance in his power, but had not been acted upon as he had had no knowledge of what he might require. Similar orders had been sent to the captain of the Vilui district, who had been instructed, moreover, to send boats up the Olena, to meet the expedition. The final success of Chekanovski's enterprise is due solely to the care with which he organized his expedition before he left the Tunguska. Had he trusted to the assistance of government officials he would have failed.

The scientific results of this expedition are of the highest importance. Chekanovski made a route-survey from the mouth of the Kopokit up to the point

where he met Achkasof. This survey joins that of the Nishnaya Tunguska, made in 1873 by Nakhvalnykh, and together with the information collected from natives, furnishes materials for a much improved map of a portion of Eastern Siberia. Müller determined the geographical position of 48 points, as well as numerous altitudes.

The magnetical observations made by Müller led to an important result. The Siberian magnetic pole according to Gauss's theory, should be in latitude 71° N. and longitude 119° E., that is, in the neighbourhood of the Olena, but Müller observed the greatest intensity near Lake Ukykit (latitude $65^{\circ} 56'$ N., longitude 105° E.), where it is 1.034 , and found that it decreased on going thence towards the north and north-east. At the Monyero it is only 1.030 ; on the Olena, in lat. $67^{\circ} 18'$ N., only 0.991 . Hansteen had previously determined the intensity at Viluisk, where it is nearly as great as on Lake Ukykit, and it would consequently appear that the Siberian pole of greatest intensity has to be looked for between latitude 64° and 65° N., and in about longitude 112° E., which is about 7° to the south and 7° to the west of the position assigned to it by Gauss.

Müller made careful meteorological observations. The absolute minimum temperature observed up to the beginning of July was -49° F. (on 19th February, in latitude $61^{\circ} 30'$ N.), the absolute maximum 82.76° F. (1st June, in latitude $66^{\circ} 26'$ N.). Abrupt changes of temperature were observed frequently, particularly in March. On thirteen days of that month, for which the maximum temperature was observed, the range of temperature five times exceeded 54° F. Thus, on the 13th of March the minimum temperature was -23.8° F., the maximum temperature 32.72° F. In the beginning of May the minimum was -9.40° F., towards the close of that month 30° , the maximum being 70.16° F. These sudden fluctuations in the temperature were but rarely attended by changes of weather such as are usually observed in Europe.

The expedition crossed the Polar limits of several trees. The silver poplar disappeared first, then the silver fir (latitude $60^{\circ} 50'$), and *Prunella vulgaris* (about 63° N.). The cedar was not met with at all, and the aspen not beyond the valley of the Tunguska. The birch, from the bark of which boats are built on the Tunguska, is frequently met with as far as latitude 63° N.; it then becomes dwarfish, and on the Monyero it is exceedingly scarce. The pine was seen on the arid slopes and heights as far north as latitude 64° . The red fir (*Pinus abies*), which is one of the most characteristic trees on the Upper Tunguska finally disappeared on the Monyero. The only Tundra wood was met with on the Monyero, and consisted of larch trees having twisted trunks and many branches.

Chekanovski carefully attended to the geological features of the country, and collected materials for a geological map. During the first part of the journey, however, the snow greatly interfered with his observations. The hills between the Kopokit and the Monyero offer the same features as those on the Tunguska. There are gentle undulations, rounded summits, terraces, some of them columnar or forming table-mountains, and conical hills, the latter occasionally truncated. The height of one of these cones was measured trigonometrically, and found to be 1325

feet above the Surungna Lake, or 2043 feet above the Tunguska. Trap rocks predominate throughout, but other rocks are likewise met with. Near the camp on the Monyero blocks of limestone, containing corals of the Silurian age, were discovered amongst the trap, and these Silurian rocks predominated between the Monyero and the Olena, where they are intersected by dykes, and partly covered by erupted or overflowed traps. The Lucha Ongokton consists of marls, capped by trap, and at its foot red and green clays, with nests of gypsum, were discovered. On the Tomba, a tributary of the Olena, corals, shells, and trilobites were found in marly, clay beds, alternating with layers of hard limestone, and marly sandstones, apparently containing no fossils, were discovered in the same locality. Further towards the north Chekanovski came upon the carboniferous formation.

It was intended at first to extend these explorations during the present year to the basins of the Anabara and Khatanga, where jurassic formations and rock-salt are said to exist, and to explore Lake Yese, the principal meeting place of the Tunguz of the Vilui district, but Chekanovski declined the conduct of this new expedition, until full instructions had been issued to the local authorities to assist him. He is engaged, at present, in working out the results of his first journey, for which purpose 1500 rubels have been granted him by the Russian Geographical Society.

RUSSIAN TRANS-CASPIAN MANŒUVRES.

SEVERAL telegrams from Berlin and St. Petersburg have recently drawn universal attention to a Russian military expedition from Krasnovodsk on the east coast of the Caspian towards Khiva, which, after the completion of the survey of the Uzboi, or ancient course of the Oxus, is to proceed southwards to survey the lower Attrek Valley. These telegrams have made quite a sensational affair of the march of this expedition into the Turcoman country; the sensational element imparted to the information, springs, however, not so much from the telegraphic transmission of the bare facts, as from the circumstance that the news has been sudden and unlooked for: that while the public were still bearing in mind the theoretic sides of the Central Asian question, which was lately re-opened in the House of Commons, they were once more apprised of Russian action in Asia, of which they had neither seen nor heard any previous indication. Quoting from the *Russian Invalid*, the correspondents of the *Times* and *Daily Telegraph* could not "wire" more than the mere gist of the notice in the *Invalid* of an expedition started in May last, and now nearly coming to an end, therefore they omitted to explain in the words of the official Russian notification that the Russian column is performing only one of the annual reconnoitring movements into the heart of the country, for the purpose of surveying little or not at all known localities, "owing to which we not only gain an accumulation of knowledge concerning the Turcoman Steppes, but also secure an intimacy with neighbouring nomad tribes."

The *Invalid*, thus divesting the military expedition of the appearance of an exceptional character and of all political significance, further explains at the outset

that, "as in years past so in the present year, the Krasnovodsk detachment will pass the summer in the Steppes, being at the same time under orders to promote the object of the scientific exploration of the Uzboi, and to closely survey the localities belonging to us on the Attrek, a survey which was but partially executed last year."

A Russian officer writing to a Moscow paper from Krasnovodsk stated that it was the intention of General Lomakin to march so as to meet a Russian detachment coming from the Russian fort on the Oxus, and that on his way back he should erect some small forts. This probably has reference to the project of establishing a military trade-route from Krasnovodsk to Khiva, to the erection of a fort as a point of observation on the Attrek, or on its affluent the Sumbar, and also to the proposed transfer of the naval station at Ashurade to Krasnovodsk.

At the same time it was stated that some anxiety was felt at Krasnovodsk on account of the smallness of the force with which the General started on his expedition. Why this anxiety should have been felt it is difficult to guess. The march of the troops is, as we learn from the *Invalid*, the ordinary summer manœuvre in the Steppes. We are not apprised of any anticipated hostilities with the Turcomans; on the contrary, we have been led to believe that the Turcomans of the Attrek or northern slopes of the mountains of Persian Khorassan in despite of their Persian allegiance were nearly all ready and willing to serve and obey the Russians, as several of their elders were reported to have expressed themselves, and, as telegraphed from St. Petersburg, the *Invalid* announces that eighteen of these elders, with some even from the vicinity of Merv, did indeed meet the Russian General at the Igdy Wells, with professions of friendship, and perhaps also with promises of fealty and obedience.

As regards the numerical strength and composition of the expeditionary force, there could have been no reason for the anxiety said to have been felt at Krasnovodsk, unless there prevailed an erroneous idea of the scope of the operations to be undertaken.

The troops engaged in this ordinary annual manœuvre and bivouac in the Turcoman country number about 1000 men, being drawn from various infantry regiments of the Caucasus (with the exception of 100 Cossacks), and are accompanied by four pieces of artillery and a mounted rocket company. The camels, numbering 574, and the transport train, were brought down from Fort Alexandrofsk, 400 miles north of Krasnovodsk—a distance which was performed in twenty-three days. The force is under orders to march as far as the Igdy Wells, and to bivouac there, while the surveying party executed their survey up to Sary-Kamysh, under the protection of a body of Khivan militia. When this work is performed General Lomakin will receive further instructions as to the ultimate object of the manœuvre. The correspondent of the Moscow paper alluded to above was therefore in error in stating that General Lomakin intended to march to the encounter of Colonel Ivanof's detachment from Khiva, for it appears from a letter from Petro-Alexandrofsk on the Oxus, published in the *Moscow Gazette*, that Colonel Ivanof is busily engaged in clearing the banks of the Oxus, and the line of country in the direction of Bokhara, as well as the Khanat of

Khiva, of predatory bands of Téké Turcomans from Merv. These Turcomans, numbering 300 horsemen, are said to have devastated the country around the Khivan town of Pitnak, where they discomfited a body of Khivan Uzbegs, of whom they killed nineteen, and wounded a very large number. The defenceless condition of Pitnak, which is situated opposite the Russian, *i.e.* on the Khivan bank of the Oxus, is pointed out by the correspondent of the *Moscow Gazette*, as offering an allurements to the Turcoman robbers, yet the Khan of Khiva does nothing to resist these Turcoman invasions of his territories, and displays an apathetic unconcern for the safety of the lives and properties of his Uzbeg subjects and not alone had the Russian officer commanding on the Oxus got his hands full, but he was expecting to hear of a fresh raid by a still more numerous force of Merv Turcomans, who still retain in duration and in chains the Russian gunner who was captured between Khala-Ata and Alexandro-Petrofsk, when accompanying a government caravan in 1873. It is reported that steamboat communication has been re-opened between Kazala and the Russian garrison on the Oxus, although the steamer 'Perofski' on its first trip failed to reach Nukus on account of low water.

ROBERT MICHELL.

DARDISTAN.

WE present our readers this month with a map of the countries lying between Kashmir and Panjkorah. This map is still far from perfect, for the greater portion of it is based upon native intelligence, but it nevertheless contains a great deal of information not to be found on any other map published up to the present time. A short statement respecting the principal authorities upon which it is based will enable our readers to form an opinion of the dependence to be placed upon it. The British territory and Kashmir, with the exception of the eastern portion of Chilas, annexed recently, are based upon Sheets 1 and 5 of the Punjab map, compiled under the direction of Colonel H. L. Thuillier, and published in 1867 and 1872 respectively. A few additions were made from Lieutenant D. G. Robinson's military map of Hazara, published in 1855. Gilgit is based upon the sketch-map published by the lamented George J. W. Hayward, in the *Journal of the Royal Geographical Society*, and several names were added from Dr. Leitner's itineraries.

The numerous mountain summits scattered over the remainder of the map are taken from Major T. G. Montgomerie's frontier map, No. 4, published in 1873. These positions were obtained by the officers of the Trigonometrical Survey, carried on under the direction of Colonel Walker. They are exceedingly numerous, and enable us to lay down on the map the principal mountain ranges and valleys, thus imparting a degree of accuracy to the general features of the country delineated which could not have been obtained by merely combining the information derived from native travellers. The districts beyond the Black Mountains, as well as Daishi and Nindihar and Alahi are laid down from Colonel H. C. Johnstone's sketch-map of the Black Mountains, and country adjoining Ugrore, published in 1868.

The country of the Yuzufzais, including the valleys of Swat and Panjkorah, is based almost exclusively upon H. W. Bellew's excellent report and the map accompanying it, supplemented by information derived from Capt. H. G. Raverty's account of Swat (1859), the very unsatisfactory route-survey of the havildar who travelled from Peshawur to Chitral, and upon a map compiled by a native traveller in the service of the Pânjab Government, and translated by Dr. G. W. Leitner, who has published it in his work on Dardistan, just issued by Messrs. Trübner. We have been careful to lay down the boundaries of the numerous Afghan tribes, and this information will be appreciated all the more as Bellew's map is printed so badly as to be hardly legible, and these boundaries cannot be traced upon it.

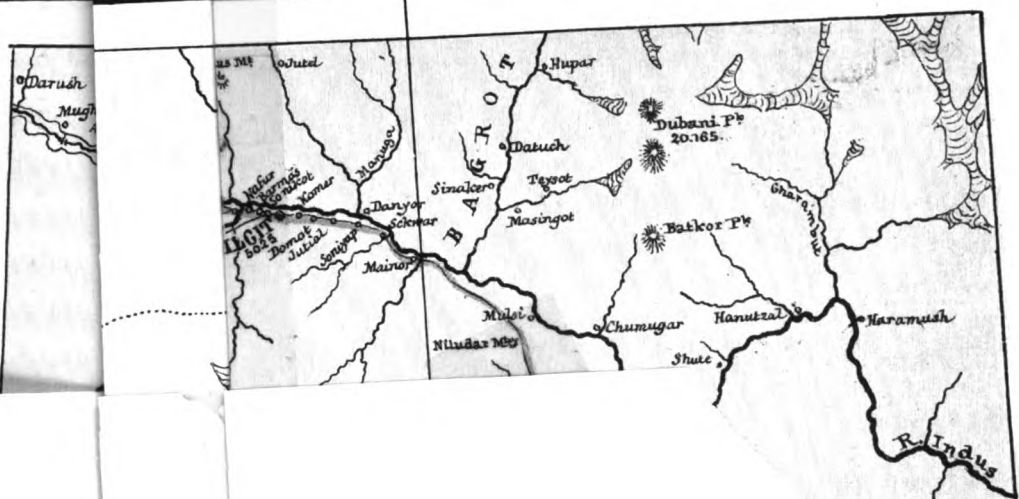
The remainder of our map, including Chilas, Kandia, and other districts on the Indus, is based almost exclusively upon itineraries collected by Dr. Leitner, and published in his *Dardistan*. The task of adjusting and combining these routes was by no means easy, for bearings are not given at all, and the distances, in many instances, are contradictory or omitted altogether. Future researches will no doubt prove us to have been mistaken on several points. Information respecting these countries could no doubt be obtained easily by officers stationed near the frontier, especially since Eastern Chilas has been brought under the authority of the Maharaja of Kashmir. We venture to draw the attention of Colonel Montgomerie to these frontier districts, and trust he may be enabled, at an early date, to publish a map more complete than the one compiled by us from very inadequate materials.

E. G. R.

THE LOWER LANDES.

THE dark forests and the grey deserts which must be crossed before your tourist in search of the beautiful and the pleasant can gain a glimpse of the imperial village of Biarritz are rarely glanced at by travellers. Any novel or newspaper is preferable to a straining of the eyes towards those monstrous woods and undulating wildernesses. But if, at a roadside station, where an old woman with a blue handkerchief round her head waves a red flag, you choose to descend, taking the chance of supping off a dirty omelette, and sleeping in a granary, there is a new world open very unlike even that of the Arcachon Landes—though closely associated with them—which I have already attempted to sketch. Here, on the border, is the oasis called affectionately by its people "Paradise," for fountains and fruit-trees interpose a green line, deepened into a valley, between the two solitudes of sand. Little groves and lakes break the great and sorrowful uniformity; and the temptation is difficult to resist of eating lotuses among these shades, instead of pushing into the true country, and comparing the Born with the Bordeaux Landes. For Landes they are still, although, from the commencement of the Marensin district, they change into a comparatively fertile soil.

I was surprised by the frequency in these parts of green patches, always of course in the neighbourhood of waters without apparent source or outlet; they are often deep, and contain fish; but, in some instances, connect-



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ing canals have been constructed between points which, the inhabitants declare, were formerly bays or inlets of the sea. Many theories, however, are afloat with reference to these mysterious gatherings of water on the fringe of the French Sahara, and it may be questioned whether the Academy itself would give a preference to any one among them; but that was, at any rate, not my object. Curiosity had been tempted by the story of some cottagers who, alarmed by the sun not rising, discovered that they had been buried up to the chimney by "a blow of dust." It seemed an uncomfortable region to live in, and not a too inviting one to explore, however cursorily, since the very sea—"the sea of the Landes" it is termed—is not less abandoned of men and their works than the sandy interior itself. For it there is no Bordeaux, no bright capital of kingly Aquitaine; no anchorage, no shelter offers itself; vessels sail far aloof; for danger and dismalness appear to haunt the entire territory. Nevertheless, where men and women are there must be habitations, of whatever kind, and sundry rough huts, perched in a stray manner along the beach where it is solid, are pointed out as the habitations of wreckers, and beyond all doubt, to judge by their construction, they have been built from wrecks. Some go far enough to declare that to this day the sailors of Labourd are pirates; yet these seem to be, taken in a mass, only tales of my grand-father. I found in Marensin a plentiful cultivation beneath the shadow of the pines, and these said pines are at once the curse and the blessing of the district: in aspect nothing could be more repulsive; in beneficence, nothing could be more genial. But where to lodge for a night? they point up an avenue, black as one of Gustave Doré's distances, and say, "There." Imagine fifty Fontainebleaus in one, and then conceive the walk, until the wigwams of the Lower Landes were reached; the village of Castets, ensconced in a clearing, like that of an American forest; but hospitable so far as hospitality can be intelligible in a prairie of pine. Its people used to be turbulent on their festival days, but now they content themselves with lighting bonfires on the tops of the sand-hills, dancing about with pitch-torches in their hands, firing guns, and mocking the sorcery in which they once believed. I saw none of this, however; I only saw on the way—slightly irregularly taken, since the chance of revisiting so curious a corner of Europe might not recur—and saw with astonishment, certain ironstone monuments of an unknown date, others more recent, yet scarcely so interesting, and the ancient Basque type idealized.

At Castets there was another stranger, a French gentleman from Bordeaux, whose sketches were as irradiancies of light through these solitudes, and he told me some things worth hearing. In the first place, he said, this vicinity was flattered by the presence of many escaped convicts and absconding bankrupts, who were rarely pursued so far; that Jean Valjeans himself might have had a secure asylum here; that the local habits and characteristics are gradually wearing out; that education has made its appearance; that the Gascon idiom is softening; and that the people are actually learning French: civilization, in fact, had reached this grim borderland of a barbarous past. It must have been a simple kind of civilization, I thought, when I was shown a wealthy landlord, without shoes or stockings, walking into the dirty inn and heard him

beginning a loud chatter about bull-fights and horse-races. But that was in the Marensin, and not at Castets, where this gentleman, or his representative, would, in all likelihood, have spoken and acted more brutally still. Nevertheless, let me be just to civilization, as it manifests itself in these wildernesses of pine.

Soustons, in the depths of the forest, is, be it known, an important centre; has its municipal buildings, its avenues, its inevitable four-cross roads, its hackney-vehicles, though the woods are withering around it through the excessive greed of the proprietors. Such, at all events, is the hearsay of the country people. I was not long enough in the neighbourhood to judge. But, besides the gum gathering, I saw only patches of indian-corn, oats, and rye, with what are known as "sand-grapes," red and white, yielding a beverage to which I was compelled to submit at Castets, and which was as rough as the sand itself, with an under-flavour of clay. How much of this stuff—I called it "wine"—is produced? About 100 barrels a year along the whole border! Then how comes it that the men, women, and even children here, so different from those of the Bordeaux Landes, are continually intoxicated? The very reason; their wines are more fitted to produce brandy. Brandy! well, the charcoal-burners of the Black Forest drink better, white and fiery though it be. And it is pitiable to say that, in these "other Landes," as the simpler folk of a superior region scornfully term them, each oasis of agriculture or population has its auberge, with pretty roof and porch, reeking at every night-fall with debauch, and clamorous with abominable songs, such, however, as would not be comprehended in the lowest cabarets of the Fauxbourg St. Antoine. And this, so far as my experience went, was on Sunday, but the roysters are unremitting, nevertheless, in their devotions at the Shrine of St. Jacques.

Altogether, the denizens of this region are far less attractive than the stilt-walkers, farther on, towards the sands and bays of that pleasant Arcachon, which none can visit without desiring to visit it again. It is not that they are the more sophisticated by intercourse with great cities and corrupted populations. The contrary is true. They rarely see the face of a stranger; a railway, indeed, leaves the trail of its steam and smoke among them; but it runs between the sand-hills and the sea, and little is noticed of that country without roads, or carts, or direct communication with the outer world. Occasionally a speculator, and regularly a tax-gatherer, visits the abodes of Born, Mimizan, and Marensin; but these are only the maritime frontiers of the wilderness. In the interior, except where a sort of highway leads to Soustons, I doubt whether even a tax-collector penetrates; for what is to be gathered there? As for artists, I saw not a single easel in all the dreary land, yet it might not be unsuggestive of ideas. Now from the summit of a low hill, a unique landscape spreads itself out, barren, indeed, but picturesque; a dim yellow plain; a succession of sheets of water, dazzling, as if sprinkled with snow; a singular gathering of vapours, amid which the rising green hillocks appear like ships upon a sea; and, beyond all, a blood-red sun descending, with a force and colour Egyptian in their splendour. The few streams, slowly flowing, are nearly rose-coloured by day, on account of the soil through which they flow, and, in the evening, change from tint to tirt,

until they seem, though darkly, to burn. If, then, less fascinating in the simplicity of the life they reveal than the Southern Landes, the more northern are, possibly, more naturally imposing to a foreign eye; so lonely are they, so utterly desolate, so far apart are the homesteads, and so little do they resemble—except where those cabarets I have spoken of abound—the manners and customs of Europe. Is it Europe? There might be a doubt upon that point between this and Libya. The enterprise, however, of the nineteenth century has been no more wanting to the Landes of Born, Mimizan, and the Marensin, than to those of the upper province, and similar methods are employed to check the devastations of the rolling desert.

As I have suggested, while there is less of industry, there is more of natural power to counteract the encroachments of the wilderness. It is a battle of water and sand, not the water of the sea, which merely heaps up the deposits from the shore, and aggravates the soil, but that of many streamlets pouring down, which at once feed and freshen the lakes, and keep the oases green. Perhaps, though, I may have been slightly unjust to the rough people of these villages. True, they are not like the hut-dwellers whose hunting-grounds (for resin) stretch back in such shadowy masses from that fine Biscay inlet where Arcachon has built its villas, and where the boats come in, white by day, and twinkling by night, as if a sort of enchantment had taken possession of all the scene; and it is, no doubt, repulsive, upon arriving at a primitive village, to be saluted by orgies and songs of rudeness, where something better might have been anticipated; but "let the king's justice be done," a precept I saw carved in wood over the tavern lintel of de Castets itself, and so I admit that, in one deal-built hamlet, surrounded half by precipices, and half by pines, with a shade of chestnuts above, there was a tinge of the Landes character, albeit not cognate with that of the stilt-walkers, with whom, positively, I fear I have left some human sympathies, which would never do, because they are "not Frenchmen but sand-hoppers."

At Saint-Girons-du-Champs—how like our St. Giles-in-the-Fields!—a small rivulet ran sparkling among the cabins of the poor inhabitants: there was a midnight dance going on; lurid among the trees shone the resin torches; the revellers drank—what, I cannot say, having brought my confidential dilution from Bordeaux; they jested and flirted, and might have appeared happy with their snatches of songs resembling the cries of bitterns on the edges of marshes, had it not been for the excessive pallor of their countenances, flushed though these were by the unnatural light from the improvised link-boys of the wood. I am quite aware that the hours spent amid these scenes might have been better employed in asking about the inroads of the sea upon the sand, the development of lacustrine enterprise for the furtherance of projects which shall cause the desert to blossom as the rose, and the increase of alluvial as compared with sandy soil. But it cannot be helped, and although in the ordinary course of things a house is, or should be, more interesting than a rock, and a field of corn than a barren beach, occasions may arise in which the ruin may triumph over the castle, the stone over the structure, the barrenness over the

harvest. It is, of course, consolatory to know that the valleys of Medoc were once parched wastes, and are now among the wine-gardens of France. All things come to those who wait, according to the national proverb. Meanwhile, is it wrong to rejoice that there survives, within those near limits, an Egypt without corn? Not for long, however. The cultivation of these wildernesses is, as I have before endeavoured to point out, an ambition which fascinates many Frenchmen at the present day; doubly so, because they have to deal with lands, not merely barren, but shifting also. The purchasers of estates have to fix their position before undertaking to cultivate them. It is as though a building speculator were to stipulate that his plots should not be overwhelmed by the sea or sunk by an earthquake; but the future is full of hope for these conquerors of a wild land, by no means so wretched or so desolate as fantastic Parisian writers, for the sake of effect, often represent it to be.

There is a little, it may be allowed, in the more northern to compare with the Southern Landes. I did not, at any rate, meet in them with the same pastoral characteristics, so to speak, because, to my mind, neither of these deserts is Arcadia—yet between two things, not copied one from another, there must be a contrast, more or less, and I prefer the quiet songs, and innocent dances of the tree-made huts, where the stilt-walkers stand, while their wives and children dance, sometimes on stilts also, though very far from resembling Mr. Sleary's troupe, to the better educated savages of de Castets, or the accomplished toppers and songsters of St. Girons-du-Champs. In the one, I saw the white Indian simple; in the other, the Red Indian, metaphorically speaking—a little cultivated by whisky—distilled from vine-tendrils, leaves, and grape skins. The question now is, will these populations, the one so different from the other, disappear? The Landes, in their actual state, unquestionably will, since water can convert sand into soil anywhere throughout the world; but, for all their stilts and their long-descended prejudices, I imagine that the Landais, instead of being "wiped out," will rejoice in the possession of a fertile, rather than of a hungry and ungrateful region.

HORACE ST. JOHN.

THE SCIENTIFIC WORK OF THE ARCTIC EXPEDITION.

SHORTLY after Mr. Disraeli's Cabinet had resolved on the despatch of an expedition to the Polar regions, the President and Council of the Royal Society were invited by the Lords of the Admiralty to offer any suggestions which might appear to them desirable in regard to carrying out the scientific conduct of the expedition. The result of this proposal is now before us in the shape of a bulky manual, of the natural history, geology, and physics of Greenland and the neighbouring regions, together with a series of instructions for the guidance of Captain Nares and his officers for the further prosecution of the knowledge already acquired and detailed in the manual. The whole has been ably edited by Professor T. Rupert Jones, F.R.S., under the direction of the Arctic Committee of the Royal Society, and published by authority of the Lords Commissioners of the Admiralty.

In addition to the above-named manual and instructions, we have also a selection of papers on Arctic geography and ethnology, reprinted by order of the Royal Geographical Society, forming in all a goodly quota of scientific Arctic literature, and leaving but little to be desired for the instruction and guidance of those gallant fellows now on their way northward.

The manual consists principally of reprints and excerpts from transactions, proceedings, journals, magazines, and other widely-scattered sources, now for the first time collected within the compass of one volume. These detached papers are divided into two parts, the first relating to biology and zoology, and the second to physics. Notwithstanding the haste with which the whole has been compiled, it is almost a marvel that so much has been done, and done so well, in the limited time.

The first part is subdivided geographically into three districts, the first including Davis Strait, Baffin Bay, and the coasts to the northward; the second, the great mass of islands or Arctic American Archipelago lying between Baffin Bay and Behring Strait; and the third, East Greenland, with Spitzbergen and Franz-Joseph Land.

It would be a mere recapitulation of names of authors and their works to attempt to give any account of the contents of this manual. A large portion of the contributions is from the works of Drs. Robert Brown, C. Lütken, and J. D. Hooker; but there are several most valuable monographs from the pens of other writers.

The instructions for the use of the Arctic expedition are, like the *Manual*, divided into two parts; but strangely enough, as proceeding from the same editor, the subjects are in inversed order, Part I. of the Instructions relating to Physics, and the second part to Biology.

The Instructions for Physical Observations deal first with the astronomical phenomena that will probably occur in the regions in which the ships may be at the time; the eclipses and occultations having been carefully computed by Mr. Hind, the superintendent of the *Nautical Almanac*. The occultations include the stars of the fifth magnitude, that may be visible in or near 80° N. latitude, and 60° W. longitude.

The suggestions for observing the tides, by the Rev. Samuel Houghton, include a summary of Arctic tidal observations already made, which, scant as they are, will prove of great importance when collated with those that will be obtained by the present expedition; but the difficulties in making a successful series of tidal observations in such a climate, as may naturally be supposed, are very great, and unless they are observed serially and with great care, they are of little value. Dr. Houghton suggests hourly observations of height for one month at the times of the solstice and equinox, while at intervening periods the tide should be registered every *four* hours of *mean solar* time. This amount of observation can scarcely be expected, for at the period of the winter solstice it will scarcely be practicable, and at the time of the summer solstice the expedition will probably have too much work to be enabled to spare observers, even should other circumstances be favourable. At the time of the equinox, observations may be made with advantage, if the passages are not too much hampered with ice to prevent the flow and ebb of the true tidal

wave. As much depends on the observation of tidal phenomena, it is greatly to be hoped that a good series may be obtained.

The tidal instructions are followed by those for Pendulum Observations for determining the figure of the earth, by Professor Stokes, the Secretary of the Royal Society; and these by directions for collecting the meteoric (cosmical) dust, as detected by Professor Nordenskiöld, in regions far distant from any source of dust.

As may be imagined, the subject of Terrestrial Magnetism is considered one of importance, and the three consecutive maps appended to this section of the Instructions, are in themselves extremely interesting, especially those relating to Inclination (Dip of the Needle), and Declination (variation of the compass). The Instructions are by no means lengthy, and may be summed up in the first paragraph, which states that "The determination anywhere in the Arctic regions of the elements by which the earth's magnetic force is usually expressed (*Declination, Inclination, and Intensity*) will be valuable."

Magnetism is followed by Meteorology, the instructions for which were prepared at the Meteorological Office, from which department also the meteorological instruments were furnished. *The quality of observations* is insisted on as of *much greater importance* than the quantity, and two-hourly or even four-hourly readings are recommended. Very clear and explicit directions are given for the thermometric and hygrometric observations. As in a measure connected with meteorology, a few notes on observing auroral phenomena is added by Professor Stokes, but as these cease with a very high latitude, we fear that but little will be added to our knowledge from the voyage of the 'Alert' and 'Discovery.'

The instructions for ascertaining the electrical state of the atmosphere are by Professor Sir William Thomson, but the observations and the instruments themselves are of so intricate and delicate a nature that, without some previous knowledge of the subject, it would be impossible to give a fair idea of the observations required, within the space allotted to us.

The science of Optics is one which of late years has become of considerable importance, through the invention of the spectroscope and the investigation of the laws relating to polarization of light. This has invested the observations to be made by the Arctic expedition with a greater interest than that attaching to any previous expedition. Very precise instructions are given for observing the solar spectrum, with a view to terrestrial absorption and the spectrum of auroras. Spectroscopes are supplied specially for each purpose.

The article on Polarization of Light is, as might naturally be expected, by the Treasurer of the Royal Society, Mr. Spottiswoode, and clear and explicit directions are given for the detection of polarization in auroras and ice-blink, suitable prisms having been furnished for these observations.

The physical portion of the instructions concludes with some very practical hints towards observations in the Arctic Regions, by Professor Tyndall; those with regard to the movement of the Glacial Sea, both at the coast and inland, will prove particularly instructive, should the 'Alert' or 'Discovery' be in a position to watch its movements by means of theodo-

lite angles. The range of sound and the aerial echoes are also dwelt on as worthy of observation.

The instructions to the naturalists engaged in the Arctic Expedition will keep those gentlemen well employed if they can attend to even a small portion of the subjects to which their attention is solicited. The first section of these instructions is by Dr. Albert Günther, F.R.S., on the Mammalia of Greenland, and although the number is small, the observations that may possibly be made on them will be valuable, and particularly in their distribution or gradual disappearance towards the Pole. The naturalists are earnestly exhorted to collect any new or partly new species, met with north of 80° N. latitude, and directions follow for ascertaining the peculiarities of some of the well-known species which the absence of skilled naturalists in former expeditions have prevented from becoming known.

The Cetacea are next described by Professor W. H. Flower, and useful directions are given for observing the habits and peculiarities of this interesting order. Where practicable, good and accurately coloured drawings of the animals from actual measurements are a great *desideratum*. The contents of the stomachs are to be noticed, with a view to ascertain the natural food of the animal. The description of the different species are briefly described, but still with sufficient detail to enable an unscientific observer to distinguish them.

The instructions in Ornithology will not prove difficult to carry out, "all being fish that come into the ornithological net." Excepting in the very commonest species, specimens should be preserved of all the species of birds met with during the expedition. Examples of both sexes in their various plumages, of the eggs, nestling, and immature form of such as breed in the country, should be preserved. This, we should think, with the number of fowling-pieces on board, will keep the hands of the collectors well in. But there is one particular instruction to the collector not given, which we think might have been added, the more especially as the duty may fall on the unscientific, although maybe ardent collector, and that is, careful measurements of the bird as soon as possible after its being shot, and before skinning, for we may see in some of our best museums birds set up with elongated necks, such as are never seen in nature.

The instructions on Ichthyology are by Dr. Günther, and should more properly have followed his paper on Mammals.

Mr. J. Gwyn Jeffreys, in a short paper, gives directions for making observations on and collecting Mollusca, but excepting under very favourable circumstances, we cannot expect that much will be effected in this branch of science; the towing-net of muslin or fine gauze and the dredge, are very agreeable articles to handle, and the examination of their contents very interesting to separate from the *débris* in a tropical or even temperate climate, but when everything freezes the moment it is out of the water it requires great zeal and perseverance to devote oneself to this pursuit.

Dr. Allman's paper on collecting and preserving Hydroids and Pollyzoa, is almost too scientific for any but a skilled collector, which we think a pity, for many sailors become active collectors if taught in a simple way. His instructions on the construction

and method of using the towing-net, and notes on the animals that may be obtained by its employment, are more explicit, but the same remark on the uncongenial nature of the employment will hold good, as made in the preceding paragraph.

The instructions in Botany, by Dr. Hooker, form one of the most interesting papers in the whole series. Apart from its direct object, it is commendable as being written in such simple language that an intelligent seaman could undertake the work of a scientific collector with very little extra aid. This may more particularly be said of the section on the collection of Marine Algæ. Particular attention is directed to the ascertainment of the power of seeds to resist cold whilst retaining their vitality, and samples of various seeds are furnished for the purpose of testing them, plain and simple instructions being given for making the experiments, which will prove an interesting subject for study in the long winter night, when different gradations of cold may be regulated, although in this case the absence of light may possibly interfere with their germinating so freely as they otherwise would. The seeds supplied for experiment are mustard, cress, radish, turnip, pea, bean, sweet-pea, wheat, barley, oats, and maize.

The temperature to which Arctic plants are exposed during the winter, where covered with snow, is also a subject for investigation.

The general instructions for observations in Geology, by Professor A. C. Ramsay and Mr. Evans, the President of the Geological Society, commence with an enumeration of the implements and instruments required in carrying them out. The directions are very explicit, and are greatly aided by woodcuts, particular instructions being added for glacial observations.

Professor N. Story Maskelyne, F.R.S., has added a paper on collecting Mineralogical Specimens, in which he lays much emphasis on the necessity of collecting specimens of every distinct kind of rock, and he adds—"To the mineralogist rock specimens have a special interest as being aggregates of minerals, and often containing crystals in cavities, or otherwise distributed through them, from the presence of which the history and associations of the rock itself may be gathered. Hence a judiciously made collection of rocks has the character of an index to the petrology of a whole country."

The subject of Meteorites and Meteoric Iron in connection with Greenland is naturally an interesting question, and directions are given for a careful examination for it at a place called Ofvåk on the island of Disco, from whence Professor Nordenskiöld brought some large masses of meteoric iron, and since which a mass of iron of nearly twenty tons in weight has been brought.

The concluding paper of the instructions is by Mr. J. W. Judd, on Volcanoes or evidences of volcanic action, a class of inquiry which will prove difficult in an Arctic continent.

The "Arctic Papers" of the Royal Geographical Society form an excellent addenda to the Manual of the Royal Society, nor can they be termed altogether reprints, as, for instance, the principal part of the paper, "Notes on the State of the Ice," by Admiral Sir R. Collinson, which, although having little connection with the route followed by the present Arctic expedition, is, nevertheless, of great interest, as

bringing together a number of stray and otherwise detached observations of general importance. The notes may prove of great service to Captain Allen Young's Expedition, for if he is successful, as we hope he may be, in getting to the southward through Victoria Strait into Dease and Simpson Strait, there is every probability of his being enabled to coast westward along the north of America to Behring Strait. The first article, "On the Physical Structure of Greenland," is also one of importance and great interest. The article on the "Western Eskimo," by Dr. Simpson, is full of observations on the habits and customs of that most interesting people. The work closes with a number of questions of *desiderata* for the consideration of the voyagers.

As a kind of supplement to these manuals and instructions, the Hydrographic Office of the Admiralty has issued a pamphlet of hydrographical remarks on Davis Strait, Baffin Bay, Smith Sound, and the channels northward to $82\frac{1}{2}^{\circ}$ N., compiled from various authorities.

"In a multitude of councillors there is safety," but when we glance at this pile of advice and instructions, our thoughts can but turn to the means for carrying them out; certainly two scientific gentlemen are appointed to the expedition, and we do not doubt their zeal and ability, but apart from those observations on Magnetism, Meteorology, &c., that will devolve on the officers of the ship, there is sufficient to engage the attention of half-a-dozen scientific men, not to specify more particularly a trained geologist, the want of which is a serious loss; true, some volunteers may be found among the civilian officers of the expedition, the medical staff will probably greatly aid in collecting and preserving specimens; the chaplains, also, may do good service beyond their clerical duties, if so disposed; and as the opportunities of collecting will be but few—for the ships and travelling parties cannot afford to be delayed for the purpose of collecting—it will be at those opportunities that a number of collectors will be most desirable, so that, with the guidance of the skilled gentlemen, we may still hope to realize a good harvest from the scientific work of the Arctic Expedition.

SIGN-POSTS ON OCEAN'S HIGHWAY.

THE PHYSICAL EDUCATION OF DUST.—MOUNTAINS.

"The strata of the entire cretaceous system exhibiting a gradually deepening sea bottom."—C. E. DE RANCE, *Geological Magazine*, No. 120, June 1874.

THERE are certain dynamical laws to which we dusts must conform if we wish to retain our positions in cosmical transactions. In our trinity of earth, air, and water the two last are active, the first is a passive element; it is at present composed of countless materials; we dusts are the minute types of all. Each and all of us accept the attentions of the active elements, but no two of us have the same mode of doing so. As their attentions are for ever changing their expressions, it follows that the conditions of acceptance must also vary, so that, individually and collectively, the dusts undergo never ending changes and movements.

The catalogue of materials that have from time to time been subjected to the attentions of the water or

the atmosphere, are strictly preserved in the heights above, and in the depths below the waters; the whole formation is the result of the physical education of dust. We shall endeavour to confine ourselves to the actual construction of mountains in this chapter, so that it will be well to have a definite idea of what a mountain is.

There are degrees of comparison all through nature. A mole-hill is a mountain to a worm, an ant-hill is a mountain to a beetle, Greenwich hill is a mountain to a boy, and the Matterhorn is a mountain to the members of the Alpine club; all in turn climb up each, with a strong probability of coming down again. Any decided rise of cosmical matter, above the ordinary level of the locality, is a mountain to suit our purpose. All our mountains are composed of cosmical matter. Dust in some shape or another is present in every mountain. We have a visible tangible mass before us, composed of visible tangible material. The questions are, how came the dusts there? and why do they rise above the ordinary level of the locality? It would be easy to answer these questions at once, but the clouds that cling to the mountain brow have thrown a haze over attempts at clearing up their origin. An encyclopædia has pointed out that all attempts to generalize on the construction of mountains have failed. There must be some reason for this, so that before recounting the physical education of our ancestor, it will be as well to wait till we can clear off some of the haze, and the long, long lines of clouds above our heads.

Of all the authorities we have ever rested on, Sir Charles Lyell has described mountain formation most accurately in his description of the sand ripples on the sea shore. Atoms are impelled upwards till they form a ridge—an exact miniature mountain range is recorded; but Sir Charles did not carry out the principle to its legitimate limit. Again he saw similar formations in his North American travels. Writing of the islands in the State of New York, in vol. ii., p. 109, he says, "This great beach or bank forms a line of spits and low islands . . . They are all narrow and long, and when above the reach of the surf they are covered by a labyrinth of hillocks of sand, imitating almost all the variety of form which snow-drifts present after a storm." At page 103 he tells us of the parallel ridges between lakes Ontario and Simcoe. The first ridge is steep towards the lake, 20 to 30 feet high; its base is of clay, its top is sandy, it is 108 feet above the level of Ontario. The second ridge is 208 feet above the lake, and 50 to 70 feet above the ground on either side; there are boulders at its feet, and some at its top; the distance between these ridges was $2\frac{1}{2}$ miles. The third ridge was 5 miles from the lake, with a slope of only 10 feet. There are eleven traceable ridges "which cover everywhere the subjacent Silurian rocks." After a rise of about 680 feet on the Ontario slope, there is a descent of 282 feet for 42 miles to Lake Simcoe. On this slope are several ridges "at levels precisely corresponding to those which I saw on the south side." All these ridges are said to correspond with those on the uplands of the Ottawa River, and, says Sir Charles, "I consider the ridges marks of ancient water-levels, between Toronto and Lake Simcoe as referable to ancient beaches and lines of cliffs formed on the margins of channels of the sea. . . . Others, including some of the loftiest ridges, as

having originated in banks or bars of sand formed, not at the extreme edge of a body of water, but at some distance from the shore, in proportion as the waters obtained a shallowness by the upheaval of the land"—Sir Charles did not know that the shallowness was caused by the retiring of the waters. He tells us, "It is well known that on many shelving coasts the breakers give rise to banks of sand at no great distance from the beach." We shall see the legitimate end of these actions presently. Sir Charles Lyell had only one idea of mountain elevation, that idea was the cloud that clung to his mountain formation, obscuring his understanding, while his eyes perceived the action of the active forces on the passive dust.

Sir Charles mixes truth with fiction so closely that it is difficult to see the light. When writing of the fractures and fissures of the Appalachian Mountains, he tells us that "these changes have consisted of the denuding operations of the sea, which probably took place, in great part at least, during those movements of elevation which, after the period of the new red sandstone, uplifted the Appalachian strata to their present level above the ocean." The denuding system only is required to produce the changes; there was no occasion for any uplifting. Sir Charles goes on, "It was truly remarked that during the process of congelation and contraction the incumbent strata, or those first solidified, would sink and accommodate themselves to a narrower area, namely, the circumference of a spheroid of smaller diameter, and, according to their different degrees of pliability or hardness, the beds would be bent or broken." When we come to denudation we shall comprehend more about this sinking. Sir Charles tells us it happened from "the supposed original fluid nucleus of the planet, it being assumed that the earth passed gradually from a state of fusion by heat to a solid condition." Having supposed, and assumed this state of things, Sir Charles blows away his clouds by telling us—"We have only to substitute the partial liquefaction of the interior of the earth at moderate depth for the primitive fusion of the entire incandescent nucleus, and to suppose that each local evolution of subterranean heat was followed by refrigeration, and we shall discover a cause fully adequate to produce the fracture, plication, and lateral pressure of rocks, at as many successive periods of the past, as the facts now established in geology require."

It is curious to follow the footsteps of those who have followed Sir Charles up his cloud-covered mountain. We will take a step upon the path taken by Mary Somerville in her *Physical Geography*; strangely enough it makes a distinction between Sir Charles and our soundest geologists. She tells us that "the increase of temperature with the depth below the surface of the earth, and the tremendous desolation hurled over wide regions by numerous fire-breathing mountains, show that man is removed but a few miles from immense lakes or seas of liquid fire." We remark in passing that the probabilities of Sir Charles are now certainties; but Mrs. Somerville is very honest, she tells us a few pages on that "there is no proof within the historical period that any entire mountain chain has ever been raised at once, although it is generally admitted by our soundest geologists that such took place at remoter periods, and that by this means the great mountain chains of our globe have attained their

present position." She then tells us that a *contrary opinion* is advocated by *Sir Charles Lyell*: "elevation has been produced by a long continued and reiterated succession of internal convulsions, with intervals of repose." These are all clouds that will vanish when the wind blows.

No sooner are they gone than another dense mist is wafted over the scene, till we almost think the point we strive to climb to is itself a cloud. Mrs. Somerville tells us that "fossil shells of different geological periods are found at various elevations, which shows that many upheavings and subsidences have taken place in the chain of the Andes." The clear mathematical understanding of the lady is here misguided by Mr. Darwin, "who supposes that the whole range (of carboniferous limestone) after twice subsiding some thousand feet was brought up by a slow movement in mass during the eocene period, after which it sunk down once more several hundred feet, to be again lifted up to its present level by a slow and often interrupted motion." Mrs. Somerville is a favourite authoress; we seldom find a protracted rest upon her volumes, but we do wish that she had climbed her mountains without a guide.

Cloud after cloud still rises up the mountain side to impede our view; lakes, rivers, swamps, the plains, the forests, all contribute their fleeting clouds, and as they flit through deep ravine, as they sweep along the scarp, or slowly climb the half hidden brow, we begin to be impatient, and say that we cannot reach our summit to-day; our silent guide signs patience, waving his hand to tell us that they are rapidly flitting away. As we look at them, they gather in waving, still condensing masses; still rising, and forming a straight line resting on the mountain top. As nature gathers her moistures together, so Henry Woodward has gathered for us some of those misty mountain formations which we must see through before we can find our way; they are in No. 114 *Geological Magazine* for December 1873. We are told that "the question of the formation of mountain chains has of late occupied the consideration of many of our ablest and most profound physical geologists." As the cloud-line along the mountain top is the result of one cause, so "all the corrugations of the earth's surface . . . are to be regarded as the effects of one and the same cause."

If Mr. Woodward had stopped there, nature might sooner or later have asserted her rights in the enquiring mind of man; but he leads his audience back to his own cause; "whether we regard the earth as an oblate spheroid, perfectly solid throughout, or as having a more or less thick crust and a fluid interior, we are justified in considering it as suffering from cooling by radiation, and contracting in a more or less degree from a time long antecedent to the formation of the very oldest metamorphic or sedimentary deposits with which we are acquainted." We cannot waste time by asking why the solid body should be hot, or why the earth should suffer; there is no surmise, no probability now, all is certain. Mr. Woodward tells us, "thus through the unequal contraction of the earth's crust, by which the great continental areas were originally elevated as vast anticlinals above the general ocean, the first preliminary stage necessary for the commencement of mountain formation would be accomplished." We are not told what the continents were formed of, or whether the vast anticlinals were

cracked and fissured, but Mr. Woodward clothes them with sediment "resulting from meteoric action" to the depth of 10,000—20,000 or even 40,000 feet in thickness." Having done this, he asks, "Why does the yielding to horizontal pressure take place along these lines of deposit in preference to any other?" We remark, in passing, that the fact of horizontal pressure is not proved. We shall have a good deal to say about it, when we come to the denudation of those mountains which we are now trying to build up. Mr. Woodward finds an answer to his question. Professor Joseph le Conte suggests that the answer is to be found in the theory of the aqueo-igneous fusion of deeply buried sediments." We shall return to this quotation when we come to the pyrotechnic education of our ancestors.

Mr. Woodward found he had a heavy work on hand. The professor required aid. "Scrope, Babbage, and afterwards, Sir John Herschell," are called in to show that "the accumulation of sediment necessarily produces a rise of the geo-isotherms, and an invasion of the sediments by the interior heat of the earth." Here we have fiction and truth in a tangible shape. We (dusts) know nothing of interior heat, excepting that which we do produce, with which we make our volcanic mountains, and no others. Mr. Woodward having made one false step by introducing the invasion by interior heat, is obliged to show how it acts on the areas that had already begun their mountain formations—that had cooled and contracted theoretically. He thinks that "even the former moderate temperature, long continued in the presence of the included water of the sediments would be sufficient to produce incipient change—at least segregation, if not metamorphism," and then, having settled the point that the temperature "of sediments, 40,000 feet thick . . . must be nearly 800° Fahrenheit," he tells us that "such a temperature is certainly sufficient to produce not only metamorphism, but aqueo-igneous pastiness, or even complete aqueo-igneous fusion."

We cannot stop here to ask Mr. Woodward how it was that water was still included in the sediments, where the heat was, as he supposed, sufficient to produce metamorphism; we should be only producing more vapour, and greater obscurity, just as our atmosphere shows symptoms of clearing, for again Mr. Woodward hits off the truth—"with a small quantity of alkali in the included water of such sediments, all these changes would take place at a much lower temperature." Mr. Woodward is so correct on this point; that we ask in passing—Why, if a little alkali in the water could cause such a result, a larger quantity of alkali should not cause actual fusion of the rocks? We cannot answer that question till we have constructed our mountain; if we lose our clue in the pathless wastes, we should never find it again.

We have now to connect the theory before us. It is evident that if there was a melting of the sediments at a depth of 40,000 feet, there would be some pressure, so Mr. Woodward tells us that "subsidence probably continues during this process." If the process exists, he might have used certainly instead of probably; but he gets more confident as he goes on with—"Finally this softening determines a line of yielding to horizontal pressure, and a consequent upswelling of the line into a chain. Thus are accounted for, first the subsidence, then the subsequent upheaval,

and also the metamorphism of the lower strata so universal in great mountain chains." We shall comprehend sooner or later that the metamorphism, the upheaval, the subsidence, the pressure, and the softening have no connection with melted sediments in the history of mountain formation. Mr. Woodward, however, concludes his theory or his address, as far as we are at present concerned, with, "Thus, the phenomena of plication and of slaty cleavage, demonstrate a crushing together horizontally, and an upswelling of the whole mass of sediments . . . sufficient to account for the elevation of the greatest mountain chains in the world." This is very similar to what Sir Charles Lyell told us.

We had almost determined to begin our ascent here, but there are two theories that must not be passed over, because they have both attracted some attention. In the *Geological Magazine*, No. 115, Captain F. W. Hutton tells us, in reference to the contraction theory of the Rev. O. Fisher, that by it "utter confusion would reign in stratigraphical geology." The Rev. O. Fisher, in *Geological Magazine*, No. 116, remarking on the deposition theory of Capt. Hutton, says, "I should like to see a diagram showing a range of mountains formed on Captain Hutton's theory." There are those who, in their mountain wanderings, have seen patches of vapour floating upwards from the gorges on the opposite sides of ridges: the silvery vapour is very beautiful. We stop to gaze on the wondrous evolutions of each mass; we begin to think that, as they must inevitably meet on the ridge, they will envelope the scenery, and hide the view; but as each mass rises from its gorge, they meet, they kiss, and then, instead of expanding, both masses rise, revolving in vertical circles, till, like the *mares tails* in the summer sky, they mix with, and are lost in the eternal firmament around them.

We believe that Mr. Woodward and his school have built up their mountain ranges by the assistance of an internal self-existing fire of which they know nothing. Illustrious painters have given clothing and feathered wings to their cherubs, and their angels: they do not know if feathers or clothing are to be found in the heavens. Our geologists do not know if fuel or fire are to be found in the earth below; but as long as human imaginations sway the pen or the pencil, so long will the fires burn, and the feathers grow. We are led back by these thoughts to Plato, who makes Socrates tell Gorgias that the "Rhetorician therefore does not profess to teach courts of justice and other public assemblies, respecting things just and unjust, but only to produce belief."

We dusts cannot find our way through the fire world; but we find in *Chambers' Cyclopædia* a remark that leads us back to our own sign-post—"To suppose (said Professor Rogers) that mountains are elevated by a wedge-like intrusion of melted matter is to give to a fluid functions incompatible with its dynamic properties. So also the supposition that the igneous rocks were intruded as solid wedges, separating and lifting the crust, is opposed to the fact that no apparent abrasion, but generally the closest adhesion exists at the line of contact." Plato thought that the believers were worse than the teachers of error. We beg here to remind our readers that all the mountain formations we have touched upon are only theoretical, while the biography we are detailing is founded on those laws

of nature which are now, and for ever have been, in action. Previous chapters have taught us how the cosmical trinity brought about the birth, and the multiplication of dust. We have shown results under the doctrine of wisdom, "forsake ye not my law;" we have now to consider the education of dust in other seasons, when the gentle handmaid gave place to her rough brother, and when the summer ripple of the waters was changed into the raging billow. The scene seems full of confusion, we imagine ruin and destruction; but all is done by the law. As the muscles of man are developed in his gymnasium, so the girders of this earth were developed by dust, under the tuition of wind and water in the boundless gymnasium of this round globe.

We have to begin at the beginning, we have to comprehend the character of the professors before we can understand the nature of their doctrines. The wind must be looked at in every condition of force, from the fresh breeze to the hurricane, from the little whirl that licks up the dusts of our streets to the great whirlwind that severs the mountain top, that lifts up the ocean, that buries the caravan, and that even now eclipses the mid-day sun. Different localities have different names for these blustering actions of nature: the tornado, typhoon, simoon, monsoon, storm, and hurricane all come under one head, as our Professor Wind, brother to the gentle handmaid Air, and as soon as or later her successor in the education of the dusts of this earth. We have to look upon the water not only as affected by all the varied actions of the wind, and thus aiding in the education of dust, but as having special classes in his own vast gymnasium. In every class, separate or combined, under the instruction of water, or under the influence of wind, dust had to undergo his physical education.

Long before dry land appeared nature was preparing its solid foundation; that foundation is here now, and on that foundation the waters have been at work for untold millions of years. There are two actions in that work, one destroys, the other constructs. We cannot explain these actions better than by quoting a few passages from the report of Captain Nares, H.M.S. 'Challenger,' to Admiral Richards, late Hydrographer of the Admiralty, dated 18th January 1873: "At the depth of 2025 fathoms on the east side of the rise, the sounding-rod was filled with decomposed rock, showing a rocky foundation; the dredge, however, brought up ooze." Here we have examples of construction and destroying close to one another. "The rocky nature of the bottom, and the lowering of the temperature usual at that depth would indicate a considerable movement of the lower stratum of water. At this position the dredge brought up a quantity of dead hard coral . . . with no mud." Thus the forces of the water permitted no sediment, but allowed hard material to drift over the rocky bottom. "The several deep soundings taken in the neighbourhood of Bermuda prove it to be a solitary peak, rising abruptly from a base of only 120 miles in diameter." This shows that mountains are formed on the sea bed. "The stream rushing past us like a mill race," tells of the vast power of ocean currents.

From another report, dated 15th September 1873, we gather that at the Cape de Verde Islands, "the bottom water turned to run north more than half-an-hour earlier than the surface, and ran six and a quarter

hours—a regular tidal interval." So that the atoms of the same material held in suspension or solution may be conveyed to different places. "It is remarkable that the temperature at 80 fathoms, the depth at which the coral grows, is the same as that of the Mediterranean coral banks, viz., 52°; showing that water life requires similar temperature in varied places.

In a report dated 15th December, 1873, we find that in Simon's Bay "the current usually circles round from Cape Agulhas to Cape Point; on this occasion, while the water was gradually cooling, a current was circling round the bay in the opposite direction," telling us that currents can be altered by heat, by cold, or other influences.

We find in the abstract of Captain Nares' deep soundings, that the nature of the bottom does not depend on depth, 1800 fathoms gives mud, 325 hard ground, 2125 sand and mud, 2025 rock, 2435 globerizine ooze, 3025 red clay, 390 coral mud, 435 coral and shells, 175 sand, 1370 sand, 51 rock, 83 stones and gravel, 1775 rock, 2650 ooze, 750 rock, 2675 ooze, 820 rock, 2150 ooze, 500 mud, 32 sand and coral, 1600 mud, 1000 shells, 2025 globerizine ooze, and 1100 rock. Every one of these quotations tell us not only of the materials placed at the disposal of the water, but each discloses the character of the water on the locality, to which we shall refer presently.

Under the influence of wind and water the ocean bed has acquired the condition depicted by Captain Nares. The influences which have produced this uneven bed have been going on for ever. Before the productions of land and water gave materials to build with, the bed of the waters alone supplied them; the formations of those days consequently assumed the character of the materials moved by the waters. We find on mountain top, in the mountain interior, in the schists, in the granites, the gneiss, syenite, and many other rocks of the present time, above and below the sea level, the types of the only material available when dust began his physical education. All authorities consent to call these rocks primary; they belong to the so-called azoic epoch, and the illegibility of organic remains in these rocks gives a colour of truth to the nomenclature. The structure of these rocks is however so variable, the remains of organisms are so illegible, that no line can be drawn between the azoic and the palæozoic epochs. The flint nodule that has formed beneath the chalk is in itself an azoic mass; but it belonged at one time to a living organism; the siliceous matter which constitutes so large a portion of these primary rocks is a moveable, percolating substance, so that it is not impossible that the siliceous matter of these so-called primary rocks may have at one time belonged to organisms, which used silex for their clothing and their houses, as the diatom and the grass now do. We, therefore, abstain from using the titles that geology has adopted, our cosmical water-bed is formed here and there of materials, similar to those we find at all depths, and all heights; our little ancestor was born of this material, and this material, as dust, had to undergo its physical education.

We have shown in the birth of dust how two long epochs of uncounted time worked up the water-beds to form the first dry land. Sir Charles Lyell has told us how the waves leave the sand ripples and the larger ridges behind them. As the waters do these things now, so they did then in the third day of crea-

tion, and as Captain Nares finds the sea bed now, so was it in those long-forgotten days.

There was no hesitation in the wind when he began to educate dust, there was no disobedience in dust when he entered the gymnasium. Action became involuntary; he hopped, he jumped, he flew, he danced in circles small and vast, he mixed with unknown associates, he was deposited here to-day, and there to-morrow, his heavier comrades paused at the bottoms of the slopes, the lightest only stopped when the professor himself was out of breath with his exertions, and so, as Sir Charles Lyell found light sand on the clay spits of America, the lightest dusts took up the highest stations in their cosmical gymnasium.

We have shown in the multiplication and addition of our ancestor how soon his faculties were required to act. We pointed out that wisdom never allowed her servants to rest; there was always something to be done, and some one to do it. Thus, as creation went on, the winds had more to do, more pupils to attend to, still the same education went on; dust was constantly ushered into the arena, and as constantly left upon high places, heaped together in vast masses, shunted into little drifts, or deposited in the waters for further instruction there.

The discretion of the two professors was wonderful, scholars of all gifts, of all characters, and all abilities were placed under their care; they were mixed up in the fiercest strifes of elemental action; their nature, their capability was tried to the utmost; the rough were smoothed down, the heavy were in one class, the light in another, and as, in the depth of the Atlantic, the 'Challenger' discovered the light shells of foraminifera on the higher spots, and their clay on the lower, so, all through the physical education of dust, the professors have been careful to distinguish the characters of those entrusted to them. Thus, as Sir Charles Lyell saw in America (*Travels in North America*, vol. ii., p. 176), "above the granite, clay, slate, quartzite, and Silurian formations of Nova Scotia there occur strata referable to the carboniferous group occupying very extensive tracts, and resting uncomfortably on rocks of the older series." This uncomfortable condition shows that the present irregular sea bed existed when these formations were deposited upon them; and we see that under varied forces of wind and water, with varied materials at their disposal, such a result was unavoidable, while the law was not forsaken.

Under the laws laid down by wisdom, and adopted by the two physical professors for their separate, and for their united classes, the material entrusted to their care became developed in certain places, just as muscle becomes developed in the human frame by action. Before organisms were created, the winds and the waters gathered the primeval silicious matter into sediments and drifts; as Sir Charles Lyell found the light sand over the clay, so the lightest materials were worked to the highest points as we find them in the gneiss and syenite of our mountain tops, while the coarser materials were developed in the lower extremities; the whole resting on the solid foundation of this globe. As we see the mountains rising from the sea bottom now, so mountains were formed upon the sea bed at all times. As the education of dust went on so the physical classes altered their characters. Silicious matter, mixed with vegetation, formed the

second mountain ranges; upon these were deposited classes of vegetable, and as life was multiplied, the limestone formed from the remains of living organisms, was heaped up by the waters, and gathered by the winds. As the waters arranged their own classes, so we find the gneiss, the syenite, the granites, and the basalts contiguous to the formations from organic dusts.

Man has traced many of these dust deposits, he has placed the silicious gneissic and granitoid schists in the the azoic epoch; we find these at all heights, and on the sea bottom. Nature links her formations so close together, that they seem to casual observers as mere repetitions; in following on our clue we may also seem to repeat, but there are in our history and in nature classes that require the aid of the microscope. We beg attention to these classes. We cannot go through the whole series here, but we wish to show how materials of varied epochs may come together during the physical tuition of the dusts. Professor T. Sterry Hunt, in No. 114. *Geological Magazine*, p. 562, tells us that in 1827 Dr. Bigsby "found resting directly upon the ancient gneiss, a nearly horizontal dark-coloured conchiferous limestone," having sometimes at its base a calcareous conglomerate; he also found a "slaty series composed of shale and grey wacke, occasionally passing into a brown limestone, and alternating with a calcareous conglomerate in beds, some of them charged with fossils." These mixtures of matter resulting from the original deposits of dust or from the destruction, removal, and redeposit of original deposits, belong to the details of our education. We have touched upon the subject to show that, in the entire depth of dust deposits resting on the "ancient gneiss," we never find a long defined horizon of one material. So that we go on with the arrangements, that the Geological Schools have placed before us, with the understanding, that although chalk, clay, sand, slate, and granite may extend in horizontal lines for long distances, yet their foundations are laid on undulating beds, similar to the Atlantic bed, and that this undulating character is of necessity imposed upon the surface.

The palæozoic or ancient life epoch succeeds the azoic. Has not science been premature here, vegetation came before life: it is plentifully mixed with the azoic zones, and should have had an epoch to itself; it is embraced in the shales, slates, and coal-measures of this epoch, but as they form deposits separate from the siliceous schists, the conglomerates, the sandstones, and the limestones, they ought to have been separated in the index formed by man. We now come to the mesozoic, or middle life epoch, including the triassic, oolitic, and cretaceous system; all containing types of organic life; while, as shown in our heading to this chapter, the entire cretaceous system exhibits a gradually deepening sea bottom. We have already shown that this sinking of the sea bed is a result of natural laws, and while the deposits of all created forms have been laid down upon its bed for millions of years, that bed has never forgotten, up to the present moment, to offer upon shores of dry land the purest sacrifices of its silicious sands.

Under the double labour of excavation, and deposit, the next epoch, called the ca:inozoic or recent life, found high lands that had once been under water; they had furnished the dusts of living and growing organisms, mixed with their own torn breasts to form the wide, and still expanding plains, upon which the present systems

are up to this moment employed in forming their groups or classes under the tuition of our grand professors.

That which is done to-day has been done since the birth of dust. We see his physical education going on in the mighty waves of the ocean, in its great arteries, its tides, its eddies, and its whirlpools; we see the banks, the ridges, and the sand-ripples forming every moment. We see the winds taking up the dusts from the surface of the earth, and we find the drift and the sand dunes. All our present mountain tops were deposited by the same forces, all the different materials, according to their several epochs, were more or less liable to the system of education we have so imperfectly described, and as the waters have sunk in reciprocity with their structures, so, of necessity, the dusts have been left behind to assume the condition which we see.

Have we sufficiently cleared off the clouds from the mountain brow? Have we said enough for others to see nature as she is? Are we in a position to reply to the two questions in the early part of this chapter.—How came the dust there? Why do they rise above the ordinary level of the locality? If we have said enough, the simple answers to these questions will be sufficient. If we have left any one behind in the fog, we ask him to follow us into the next chapter. Dust, like man, has gone up the hill to come down again. The mountains, as we built them, are not like the mountains that we see. We were millions of years in their construction, millions of years have brought them to what they are. The footsteps of nature are very slow, her paths are very intricate, but she has left guides at every corner; the mountain stands up conspicuous as the great stratified sign-post of ocean's highway. They are found all round the world, from the Himalayas to the Beacon Hill on Salisbury Plain; from the Arctic to the Antarctic regions of all sizes, and of varied material, all dust.

Dust came there because he was obedient to the laws, he rose above the ordinary level because his preceptors did not forsake the laws, they taught to suit the genius of the pupil, and they left him as examples of discipline. Nature never rests; no sooner had dust developed his physical education to the utmost, than, like the human mountain climber, he was called on to come down again; his water-preceptor had retired from the scene, dust after dust rolled back to his bosom, till Mr. Rance finds out the inevitable result of the laws. "The strata of the entire cretaceous system exhibiting a gradually deepening of the sea bottom." We ask Mr. Rance and others to look at all the systems of each geological epoch, they will find that all tell the same tale. This gradual retiring of the waters has therefore left the mountains of dust gathered by the winds and the waves, to serve as girders of this earth, as the buttresses of the dry land, and to be, as long as they endure, legible sign-posts on ocean's great highway. We must loiter a moment on our mountain top; fogs will rise again. We have pointed out a new path, we ask others to try it; we do not wish to lead them into difficulties, but before they try our path, or before they object to it, we wish them to find out if dust is, if winds blow, if waters move; if they cannot discover these points we advise them not to walk upon our path; if they can see these points, we still hold out our little clue, we still follow nature's laws, we still invite those who can see to follow us.

H. P. MALET.

Reviews.

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SUN'S TRUE BEARING OR AZIMUTH TABLES, computed for intervals of four minutes: Between the parallels of latitude 30° N. and 30° S. inclusive, with variation chart, and instructions for using the tables in Danish, Dutch, French, German, Italian, Portuguese, Russian, and Spanish. By *Captain John E. Davis, F.R.G.S.*, of the Hydrographical Department, Admiralty; and *Percy L. H. Davis, F.R.A.S.*, Nautical Almanac Office. (Potter).

THIS work, which we have previously announced, is one of considerable importance to the seafaring community as a quick and a ready method of ascertaining the deviation of the mariner's compass. Its utility is thus clearly described in the preface appended to the book—"The increasing quantity of iron used in the construction of wooden ships and the increasing number of iron ships, render a ready and simple mode of ascertaining the deviation of the compass of paramount importance to the safety of a vessel, as well as to ensure a quick passage by steering exactly the course intended."

But although these tables are designed for use on ship-board, they would nevertheless be of great service to the traveller within the limits of the latitudes given, as in mapping a country a true bearing is far better and more trustworthy than one taken with the compass. He is also enabled by means of this work to ascertain the variation of his compass with facility.

A neat variation chart, printed in colours, accompanies the book.

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NORWAY.—ILLUSTRATED HANDBOOK FOR TRAVELLERS. Edited by *Chr. Tönsberg*. With 134 engravings on wood and 17 maps. Christiania, 1875.

NORWAY has now a complete guide-book, in every respect well arranged by its well-known editor, Chr. Tönsberg, and containing numerous views and maps. His descriptions of Norway are less flagrantly overdrawn than those in the German guide-books, which overflow with enthusiasm on every subject to which they desire to attract the attention of the traveller. The illustrations correspond with the text of the book: they are well and correctly executed. Any one who has not travelled in the places described, will never be disappointed, but rather agreeably surprised, on seeing the originals, and having once seen them, will perceive the difficulty in illustrating the natural beauties of Norway in miniature. The views are on a large scale, as their great beauty consists rather in their colouring than in their outline, it is difficult to convey a faithful idea of their general character. The main object of the book is to give the best possible idea of the places worth seeing on the different routes, to assist travellers in choosing the same, to inform them of the various advantages and difficulties they may encounter, and to point out the prettiest parts of the country, &c. The undertaking has demanded considerable exertions on the part of the editor, as he has been compelled to commence an entirely new work, and collect the information required from various authors, celebrated tourists, and scientific men in Norway. The maps and arrangements of the guide-book are excellent, and it is a most complete work of its kind.

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SNIOLAND, OR ICELAND: ITS YOKULLS AND FJALLS. By *W. L. Watts*. London (Longmans), 1875.

THIS little work is a description of a tour through the southern portion of Iceland, made by the author and a

friend during the summer of last year. Mr. Watts points out with truth that Iceland, from its volcanic formation, presents physical phenomena of an interesting character, and that it well deserves to be thoroughly explored by those who have the ability and opportunity to do so. We must confess that a perusal of these pages would not tempt us very strongly to linger among its barren plains and lava-covered hills. Still the scenery must at times be striking; and to travellers satiated with the beauties of the continent, its geysers, volcanoes, and other "lions," no doubt, present novel attractions. We regret to observe though that in some places the inhabitants have already learnt to charge extortionate prices. This will not conduce to the work of regeneration which the author, in a thoughtful chapter on the resources and future of the island, points out is both necessary and possible. The chief wealth of Iceland lies in its fish, wool, sheep, horses, cattle, and some mineral wealth. To develop these, capital and enterprise is much required; good roads throughout the island, and improved appliances for fishing being especially wanted. We beg to point out to those who would propose to visit the country that a useful list of the necessary articles for an outfit is given at page 167, and philologists who may be puzzled at the meaning of the title of the work will find, after reading the book through, that they reap their reward, by having "Yokulls" and "Fjalls" explained in the appendix.

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TAGEBUCH DES NORDPOLFAHRERS OTTO KRISCH.
12mo. pp. 108. Vienna, 1875.

OTTO KRISCH, the Engineer of the 'Tegetthoff,' is the only member of the Austro-Hungarian Polar Expedition who was doomed not to return to his native country. His body rests in a rocky cleft near Cape Wilczek, but his diary has been brought home by his commander, Captain Weyprecht, an act of piety towards the deceased which is all the more to be appreciated if we bear in mind that the members of this expedition were compelled to leave behind on board of the 'Tegetthoff' some of their most highly valued properties. This diary has now been published. It is naturally an unpretending record of facts, but gives us an amusing insight into the life on board, (the ménage on days of high festival being in no case omitted), and incidentally communicates information of scientific value. The latter will of course be superseded on the publication of a full record of the expedition. The proceeds from the sale of this little book are to be applied to the erection of a monument in Krisch's native place.

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FOUR YEARS IN ASHANTEE, by the Missionaries
Ramseyer and Kühne. Edited by Mrs. Weitbrecht.
London (J. Nisbet).

THE Ashantee campaign has added but little to our geographical knowledge of Western Africa. No scientific collections were made, no positions determined by astronomical observations, and this opportunity of collecting information with respect to the interior of the country was neglected. Under these circumstances the account published by Messrs. Ramseyer and Kühne will prove a welcome addition to our literature on Western Africa, though the geographical information given by them as not of very great importance. The authors of this book imprudently remained at Anum, a missionary station on the Volta, after the country had been invaded by the Ashantis, and were conducted as prisoners to Kumasi. On the march they suffered many hardships, but after they had reached the capital they were treated with considerable kindness. Their captivity extended altogether over fifty-five months, and they had thus an

excellent opportunity of becoming acquainted with the customs and manners of the natives. They fully describe the revolting practice of sacrificing human beings, give us an insight into the system of government prevailing at Kumasi, and furnish much additional information with reference to the causes which led to the war, and the manner in which it was conducted by the enemy. Their book is full of interest, and will certainly repay perusal.

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THE HISTORY OF PROTESTANT MISSIONS IN INDIA,
FROM THEIR COMMENCEMENT IN 1706 TO 1871.
By the Rev. *M. A. Sherring, M.A.* 8vo. pp. 482.
Map. London (Trübner), 1875.

THE author of this work has undertaken to show historically what Protestant Missions have accomplished in India since their commencement in the beginning of the last century, and as the moral and intellectual life of the nations inhabiting our globe naturally forms a branch of geographical study, a work such as this ought not to be passed over in our pages. The author, a missionary, employed by the London Missionary Society, may naturally be supposed to be prejudiced in favour of the cause which he advocates. This is indeed the case, but when reading his record of many a life spent in unselfish labours of love, we can readily understand the author's enthusiasm, though not ourselves convinced of the necessity of converting all mankind to one form or other of Christianity. The result of these Christian missions, thus far, has not been proportionate to the vast sums of money expended upon them. In 1872, the Protestant Missions of India, Burmah and Ceylon were carried on by 35 missionary societies, in addition to local agencies, who employed the services of 606 foreign missionaries. The mission-presses in India are 25 in number, and during the ten years between 1862 and 1872 they issued 3410 new works in 30 languages, and circulated 1,315,503 copies of books of Scripture, 2,375,040 school books, and 8,750,129 Christian books and tracts. There are 85 training colleges for native ministers, and training institutions for teachers, which contain 1618 students, besides 28 training institutions for girls, with 567 students. The so-called Zenana classes, which are instructed in the houses of Hindu gentlemen, are now 1300 in number, with 1997 scholars, most of whom are adults. The whole of the missionary schools contained (in 1872) 142,952 scholars, or 60,000 more than they did in 1852. The number of communicants in 1872 was 78,494, that of converts, young and old, 318,363. These results, though not as favourable as they might be, and as they would be, our author maintains, if the European public and press of India exhibited a little more sympathy on behalf of the missions, are yet sufficiently important to enlist our attention. Mr. Sherring's book deserves to be read. It is exceedingly well written, and has nothing in common with the mawkish and servile style of many of our so-called "religious" books.

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**LETRES, JOURNAL, ET DOCUMENTS POUR SERVIR À
L'HISTOIRE DU CANAL DE SUEZ (1852-56).** Par
F. de Lesseps. Paris (Didier).

THIS volume contains a vast number of letters, reports, and other documents, illustrating the early history of the Suez Canal. M. de Lesseps has certainly got through an amazing amount of work. He has overcome every obstacle placed in the way of his grand scheme, and the Suez Canal will remain a monument of his perseverance. Geographers will find but little in this volume to interest them, but it abounds in historical interest, and illustrates the steps which were taken by M. de Lesseps to pave the way for the execution of his grand work.

Cartography.

Collins's Library Atlas.

THIS Atlas consists of 60 political, 16 historical, 14 classical, and 8 railway maps, 2 star maps and 2 astronomical diagrams, which are accompanied by about 200 pages of letter-press by Dr. James Bryce, Dr. W. F. Collier and Drs. Leonhard and Schmitz, and a copious index containing about 50,000 names. The maps have been neatly engraved, are printed tolerably well, and the entire work, bound in cloth, is sold for the remarkably small sum of 21s. There are many purchasers of atlases who are content with having the positions of the principal places of the world indicated approximately, and the boundary of the various countries laid down with some approach to truth. The requirements of this class of purchasers may possibly be met by this Atlas, but not so those of the more exacting portion of the public, who demand that the most recent discoveries shall be embodied in the maps, and who desire to be able to refer to them as trustworthy guides in all those geographical questions to which maps are capable of furnishing a reply. In numerous instances no record of recent discoveries will be found in the maps now before us, and the political colouring, which is indefinite throughout, frequently fails to convey a correct idea of the extent of the various countries delineated. As instances, we may mention the extent of the Russian Empire in Asia, of the dominions of Egypt in Africa, of Turkey in Arabia, and of Oman on the Gulf of Persia. The historical and classical maps are not equally open to the same objections, though they can hardly be said to illustrate the subject to which they refer in an ample manner, and the order in which they follow each other, to say the least, is exceedingly odd. The six railway maps are mere reproductions of the political maps, with some names omitted and the railways inserted in a somewhat more prominent manner. They merely increase the bulk of the volume without adding anything to our information, and in a future edition might fitly be replaced by maps of the United Kingdom, on a larger scale than those now given. The letter-press is fairly done upon the whole, though the statistics, in most instances, are more antiquated than need be, and there are several bits of curious information, such, for instance, that the "Mosquito territory forms a monarchy under British protection."

New Admiralty Charts.

ONLY a few amongst the Admiralty Charts published recently call for particular notice. Beginning our review, as usual, with Europe, we first meet with a chart of the approaches to Stettin, copied from a Prussian chart published in 1869,* but very indifferently translated. Allowing every latitude in this respect we must nevertheless object to names such as "Great See," "Anclammer Forest," and "Ostnothafen." The former ought either to have been translated in full or not at all, and a translation of the latter ought to have been added in parenthesis, for English mariners cannot be supposed to know that it means "Eastern Port of Refuge." The Bay of Biscay is represented by plans of St. Jean de Luz† from a French chart by M. A. Bouquet de la Grye (1864) and of San Sebastian,‡ from a Spanish government map (1865).

Amongst the charts referring to Africa, that of the east coast, between latitude 5° 20' and 7° S., embracing the coast between Ras Kimbiji and the Pangani Rivers, together with Zanzibar Island and the approaches to it, is certainly the most valuable.§ It is based upon surveys

* Baltic: Port Swinemünde and approaches to Stettin, 1:73,000. (No. 185). 3s.

† France: St. Jean de Luz. 1:8,100. (No. 1345). 9d.

‡ Spain: San Sebastian. 1:5,880. (No. 88). 1s.

§ Africa, east coast: Pangani to Ras Kimbiji. 1:146,000. (No. 640). 2 sheets, 5s.

Zanzibar Harbour and its approaches. 1:48,700. (No. 665). 2s. 6d.

made by the officers of H.M.S. 'Shearwater,' Captain J. L. Wharton, in 1873-4, and is supplemented by an enlarged plan of Zanzibar, by officers of the same vessel. To the officers of H.M.S. 'Nassau,' Lieut. F. J. Grey, we are indebted for plans of Mchinga Bay (Port Nungwa) and Kiswere Harbour on the same coast.*

Another sheet contains plans of three bays or anchorages on the south-eastern coast of Madagascar, based upon French surveys.† Lieutenant A. W. Stiffe supplies us with a valuable map of the coast of the Arabian Sea, from Maskat to Karachi,‡ which has been compiled by him from the surveys of G. B. Brucks, S. B. Haines, T. G. Carless, A. Grieve, C. G. Constable, and A. W. Chitty, supplemented by surveys made by himself in 1874. There are marginal plans of Jâshak, Gwatar, and Gwâdar Bays by Lieutenant Stiffe, and of Chahbâr Bay by Captain G. B. Brucks. The chart is an exceedingly valuable contribution to our cartography of Asia.

The Pacific is represented by a plan of Savu Savu Bay of Vanua Levu, one of the Fiji group, by Mr. Barracks, Master Mariner.§

Three charts refer to America. There is a plan of Port Xagua or Cienfuegos, on the coast of Cuba, from a Spanish survey of 1836,|| and a chart of a portion of the west coast of Santa Lucia, from Captain J. Parsons' survey, made in 1863.¶ Marginal plans inserted upon the latter refer to the Grand Cul de Sac, surveyed in 1874 by officers of the 'Spartan,' Captain R. Carter, and of Marigot Harbour. The last chart to be noticed is one of the coast from Piedras Negras to Santa Lucia, and shows the approach to Monte Video.** It is based upon the most recent surveys.

The two index charts mentioned below †† are useful supplements to the Admiralty catalogue, a revised edition of which has been issued recently.

Stanford's Orographical Map of the British Isles. ††

MR. STANFORD has published an orographical map of the British Isles, which we hail as the embodiment of a great amount of conscientious labour, and trust to see introduced into every school. It is edited by Professor A. C. Ramsay, the Director-General of the Geological Survey, and does credit to Mr. Stanford's geographical establishment. The land is tinted according to height, the sea according to depth, and by these means a much clearer insight into the general relief of land and sea is obtained than where the hills are shaded in the ordinary manner. Both systems of delineating the ground have been combined on this map; and whilst the tints mark out in a striking manner the lowlands, table-land, hilly and mountainous districts, the hachured shading enables us to trace minor features, which a contoured map of this kind is incapable of exhibiting unless the contours are inserted at very small intervals. There is a marginal rain-map, very instructive, and exhibiting at a glance, the districts where the rain-fall is most considerable.*

E. G. RAVENSTEIN.

* Africa, east coast: Mchinga Bay. 1:18,000. (No. 677). 1s. 6d.

Ditto, Kiswere Harbour. 1:24,187. (No. 687). 1s.

† Madagascar, south-east coast; Fort Dauphin, St. Lucia, and Ytapère Bays. (No. 689). 1s.

‡ Arabian Sea; Maskat to Karachi, with plans. (No. 38). 2s. 6d.

§ Fiji Islands: Savu Savu Bay. 1:91,100 (No. 727). 6d.

|| West Indies: Port Xagua or Cienfuegos. 1:32,100 (No. 444). 1s. 6d.

¶ W. Indies: Marigot Bay to Gros Island. 1:24,200 (No. 197). 2s.

** Rio de la Plata; Piedras Negras to Santa Lucia River. 1:121,666. (No. 493). 1s. 6d.

†† Index sheet for the coasts of France, Spain and the Mediterranean (E). 6d.

Index sheet for China: Siam and the Philippine Islands to Japan (J). 6d.

‡‡ Stanford's Orographical Map of the British Isles, edited by Professor A. C. Ramsay. Scale, 1:740,000. London, 1875.

Log Book.

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The Eruption in Iceland.—The steamer 'Fife-shire,' carrying the expedition intended to survey the sulphur mines of Nyvaṭn, in North-Eastern Iceland, left Granton on the 6th of July. The party is composed of Captain Richard Burton, Mr. J. R. Tennant, jun., Mr. German Green (geologist), and others. Efforts will be made to examine the seats of the recent volcanic eruptions which took place from the Trölladyngja and the Herthubreith. That from the latter occurred on Easter Monday, the 19th of March, covering a district of 3000 square miles, with a layer of ashes and small stones to the depth of 1½ to 8 inches. The ashes were carried as far as Norway and Sweden.

Norwegian Exploration of the Northern Atlantic.—The Norwegian Storthing has voted 4600*l.* towards an exploration of that portion of the northern Atlantic which is bounded by the Færoe, Iceland, Jan Mayen, Spitzbergen, and Norway. The exploration will extend to the fauna, flora, temperature, and the currents of the ocean; and particular attention will be paid to the requirements of the Norwegian fisheries. This enterprise is due to the advocacy of Professors Sars and Mohn. The chief command has been given to Captain Carl Willie of the Norwegian navy.

The old Bed of the Oxus.—The long projected expedition for the exploration of the Uzböi or old bed of the Oxus has at length been undertaken. The lower course of that old river channel had been explored by Radde and Siewers, and by Stebnitzki, as far as the Igdy Wells, and its upper course was traced, in 1873, by Colonel A. I. Glukhovski, from Kune Urgenj to the Lake Sary-Kamysh. The intervening portion was to be explored in 1875. The expedition, escorted by General Lomakin, left Molla-kary on the Bay of Krasnovodsk, on the 1st of June (new style?) and reached the Igdy Wells on the 20th of that month. The scientific members thence started for Sary-Kamysh, where they were to be met by a body of troopers from Khiva. According to the latest intelligence received they appear to have reached the Charyshly Wells, about 50 miles to the south of Sary-Kamysh, and thus far they travelled along an old river bed, gradually sloping down to the Caspian, and offering apparently no obstacles to the formation of a canal. General Lomakin, on his return from Igdy, reached the Jamala Wells on the 5th of July, and will thence proceed by way of Aidin and the Little Balkan to the Lower Attek.

A Russian Geographical Gazetteer.—The committee of the statistical section of the Russian Geographical Society appointed to report on a proposition made by MM. Sobolyef and Jansson, to publish a gazetteer of Central Asia, has reported favourably on the subject. They recommend that particular attention be paid to historical geography and ethnology, as statistical data are subject to frequent alterations. The territory to be embraced by the work is bounded on the north by the watersheds of the Ural and Irtysh; on the west coast by the Caspian; on the south by the Elburz, the Hindu Kush, and the Karakorum Range; and in the east by Mongolia. The authorities for every statement made are to be carefully referred to, for future reference, and

great care is to be taken with respect to the spelling. A final programme will be laid down by a joint committee of the three sections of the Russian Geographical Society.

The Altitude of Lake Aral.—A careful barometrical levelling between the Caspian and Lake Aral was effected in 1874, by MM. Solimani and Moshkof, under the direction of Colonel Thilo. Assuming the Caspian to be 85.6 feet below the level of the Black Sea, Lake Aral would be 243.1 feet above it according to M. Solimani, and 242.45 feet according to M. Moshkof, the mean being 242.77 feet above the Caspian, or 157 feet above the Black Sea. The chief results obtained are as follows:—

Place of Observation.	Distance from the Caspian. Geog. miles.	Depression or height above the Black Sea. Feet.
Caspian Sea	—	— 86
Mertvii Kultuk, Caspian	—	— 53
Yaman-Turlu	43	+ 321
Uch-Kuduk	68	+ 286
5 m. south of Lake Sam	80	+ 282
North edge of sandy desert of Sam	85	+ 288
Jar Kuduk	91	+ 275
2 m. south of Armantai-matai Lake	144	+ 253
Koz-Kuduk, 6 m. S. of Koz-bulak Lake	150	+ 311
Culminating point	191	+ 709
Bai Kadam, well	200	+ 681
Kara Tamak slope	210.8	+ 279
Lake Aral	211.4	+ 157

Hitherto the height of Lake Aral above the sea had been supposed not to exceed 27 feet.—(*Verhandl. der Ges. für Erdk.*)

The Pei-hwa-shan* near Peking.—Dr. Bretschneider, the physician attached to the Russian embassy at Peking, paid a visit to the Pei-hwa-shan, a celebrated mountain at a distance of three or four days' journey to the west of Peking. This mountain is not to be found on any of our maps, not even on that of the province of Chi-li, published in 1871, by K. Weber. It rises to an altitude of 8000 feet, and is indebted for its name—the mountain of 100 flowers—to its exceedingly rich flora. Deep valleys separate it from the main mountain chain. Its summit forms a plateau 8000 paces in length and 200 wide, and an old monastery, dedicated to the mountain-deity, occupies it. When Dr. Bretschneider visited the mountain in May, the first signs of spring were just appearing, but several parts were still covered with snow. The prospect is magnificent; the surrounding mountain slopes are covered with woods; towards the west, at a distance of 70 miles, snow-covered mountains rise on the horizon; and at a still greater distance towards the east, the fertile plain of Peking, tinged in green and yellow, is perceived. In spite of the early season Dr. Bretschneider collected about fifty plants in bloom, which were submitted to Dr. Hance, the English Consul at Bampu, near Canton, who discovered eight entirely new species amongst them. A red primrose (*Primula oreocharis*, Hance) would prove an ornament to our gardens. The birch (in three species), poplar, maple, walnut, and larch grew on the mountain, and a new species of apple (*Pyrus Bohuashanensis*, Hance) was discovered. A botanist, who made a stay here from May to September, would certainly be able to collect several hundred species of new plants. Excursions might easily be made to neighbouring mountains, each

* We adhere to Richthofen's mode of spelling. The Russians write Bo-hua-shan.

of which appears to have a flora peculiar to itself. (*Istuyestya* XI.).

Explorations in Tibet.—The head Pandit at the Great Trigonometrical Survey has done an admirable piece of new work, having explored a more northern route from Lhadak to Lhasa than any yet Surveyed. From Lhasa he explored a new line which strikes the Brahmaputra at a much lower point in Tibet than has yet been reached, and then goes southwards into the Assam Valley.

Herr Marno has just communicated to the Vienna Geographical Society an account of an exploring trip made by him between January and March, about 150 miles to the south-west of Lado, the new head-quarters of Colonel Gordon. He penetrated to the Makraka country and got a sight of the mountains which Dr. Schweinfurth had seen eastward from the Gebel Baginze Mountain. His furthest point was Seriba Wania, in the Mora country, at the confluence of the Jei and Thore. He considers that he has established beyond a doubt that the Jei is the upper course of the Rohl River. The sources of the Jei he had not an opportunity of visiting, but from native information, he inclines to think that it has numerous head-streams, which would appear to rise in the mountains north of the Albert Nyanza. The inhabitants are smaller and of a lighter colour than those to the north by the Bahr el Abiad, and this change is one that cannot fail to impress the traveller as he journeys south. Herr Marno inclines to the general belief that Dr. Krapf's dwarf tribes, Du Chaillu's Obongo, and Dr. Schweinfurth's Akka tribes (with which the natives met by Marno are no doubt identical) form the aborigines of Central Africa.

A German Abyssinia Company.—Mr. Wolde-mar Reugé, who has lately returned from Shoa, where he stayed for two years and a half, the honoured guest of King Memelek, has founded a co-operative society, with a view to the establishment of a German colony at Ankober, the capital of Shoa. Each member is required to pay down 150*l.*, and to devote the whole of his time to the company for at least three years. Profits, if any, will be equally divided. The applications for membership have been exceedingly numerous, and the first detachment, consisting of twenty members, will start from Berlin in September. Commerce is naturally one of the main objects of this association, but it has likewise undertaken to organize the military forces of the king, to supply them with arms, to construct roads, and to import mechanics. The exploration of the interior of Africa is enumerated amongst its objects. The Austrian Lloyd steamers will call once a month at Obok, at the mouth of Tajurra Bay, and regular communication with Europe will thus be established.

Exploration of the Ogowai.—Dr. Lenz has written to Dr. Von Hochstetter, under date Gaboon, April, 1875, and furnished an account of his doings since his arrival in Africa in June last year. He first examined the Muni River (which debouches on the first parallel of north latitude), and three of its tributaries, and subsequently visited the Como River, which is the chief stream discharging itself into the Gaboon Bay. At both places he found a tribe called M'pangwes or Fan, who live in a primitive state; are armed with shields, cross-bows, and poisoned arrows, and are much dreaded on account of their cannibalistic

propensities. Both of these rivers appearing too insignificant to offer a good opportunity for penetrating inland by them, Dr. Lenz commenced to explore the Ogowai in August last, and ascended as far as the mouth of the Ngunie; and after that, in October, penetrated as far as the Okanda Country, 12° E. long. Among a variety of tribes, he came across some of Du Chaillu's dwarf Obongos. Dr. Lenz has assured himself, both from personal observation and from enquiry, that the Ogowai offers a good highway for inland exploration. He proposes accordingly to ascend the river eastward as far as possible, and then to work northward. He states, in conclusion, that he has succeeded in procuring, and has shipped to Hamburg, a pretty good specimen of a live gorilla.

According to the most recent tidings, Herr von Homeyer and Herr Soyaux were to have started in May last from the south coast of Loanda; Drs. Güssfeldt and Pechuel-Losche from the coast north of the Congo, and Dr. Lenz up the Ogowai.

Mr. R. B. N. Walker is on his way home from the Gaboon, after just completing a quarter of a century's residence and business connections with Western Africa. His main object, we understand, besides recruiting his health, after ten years' continuous residence, is to publish a work on the Geography, Anthropology, Natural History, and Commerce of Gaboon and its neighbourhood, and the other colonies and settlements on the West Coast. Few have accumulated more stores of information, and are so thoroughly versed in the native dialects and trade; and he is, therefore, fully competent to give trustworthy and novel information.

Ernest Giles's Exploration of the Interior of Australia.—We have already announced Mr. Giles's return to Finness Spring. The following telegram contains more ample details respecting his explorations:—"On March the 24th left Youldeh, which lies 135 miles north-west from Fowler's Bay; Mr. Richards obtained for me a native guide, who knew the country some distance east. He took us first to Pylebung (64 miles), an extraordinary native dam, and a clay tank, with clay circular wall 5 ft. high round it. It is a most astonishing thing, considering that it is the work of the aborigines. Thence to Whitegin—a small rock-hole—30 miles. Thence nearly north-east we reached Wynbring, a fine rock-hole in the crevice of granite rock, which stands about 50 ft. high, and is 2 or 3 acres, perhaps, in extent. Youldeh, Pylebung, Whitegin, and Wynbring are all in the densest of dense scrubs, heavy red sand-hills, with thick mallee, mulga, acacia, grevilles, casuaxina, hakea, and spinifex; the dead underbush so thick that the camels could scarcely move along. Wynbring was 100 miles from Youldeh, and lying 10° south of east from it. From here the guide knew the country no further, and declared that beyond this point there was 'nothing, nothing.' Leaving Wynbring we came 220 miles through the most terrific scrubs, with an open streak of 30 miles between, to a claypan with water in, and that saved us. The three horses died of thirst, one at 65 miles, one at 150, and the last at 168 miles. The camels carrying water, we gave the horses as much as possible, till we were reduced to three pints. The heat was great, the thermometer day after day standing at 102° in the shade. It was

impossible to travel at night, as we should have left every eye on sticks in the scrubs. The 220 mile stretch from Wynbring to the claypan was done in eight days, the camels averaging 28 miles per day. They are wonderful, awe-inspiring, and marvellous creatures. I never praised God so much for anything before, and for such creatures I thank you and praise Him. Having found water, our progress in was easy, each walking and riding by turns. I just touched upon the edge of Lake Torrens. From what I have seen I judge that there exists a vast desert of scrub of a triangular form, the base of which is at or near the western shores of Lake Torrens, and the sides running north-westerly from the southern foot, and most probably west from the northern cone to an apex at no great distance from my starting-point, Youldeh, and I think a line north from Youldeh would pass through it in but a short distance. The way I came was nearly along its greatest length. It consists of two deserts, divided by a strip of open country, about 30 miles broad. The western and denser one I have named Richard's Desert, in gratitude to Mr. Richards for his own and his native's guidance; and the eastern one I have called Ross's Desert, as it was that that baffled Mr. John Ross, who got through the eastern, but never entered the larger western one. I shall hasten to Beltana, and am quite confident of the successful issue of the expedition."

Macleay's Expedition to New Guinea.—Mr. William Macleay sailed from Sydney on board the barque 'Chevert,' fitted out at his own expense, for the purpose of exploring the coast and rivers of New Guinea. He is accompanied by Captain Edwards, Captain Onslow, R.N., two naturalists, Messrs. Masters and Brazier, and three collectors of specimens of natural history. The 'Chevert' carries a steam launch 36 feet long, in which it is proposed to attempt an ascent of the Fly River.

Fiji Islands.—The measles imported by H.M.S. 'Dido' have carried off from one-third to one-half of the native population. On Ovalau, out of a population of 1500 natives, no less than 507 died (up to 24th of April last), and the disease spread thence over all the larger and smaller islands of the group with frightful rapidity. In the mountains of Viti and Vanua Levu it has annihilated whole tribes. The population of the Windward Islands has been decimated. The ravages of the disease have been unnecessarily aggravated by the disinclination of the natives to submit to medical treatment, and from their belief that it was imported intentionally, in order to destroy them. The principal chiefs, a majority of those who signed the deed of cession, have fallen victims to it. An occasional correspondent of the *Times*, estimates the present population of the group at 1200 whites, and 60,000 to 70,000 natives.

The material condition of the new colony is full of promise for the future, though the low prices of cotton in England, coupled with the disaster wrought by a terrific gale of wind on the 8th of January, and the ravages of the measles, have produced a state of commercial prostration. The cultivation of sugar is only in its infancy, but the results thus far are exceedingly satisfactory. Sea-island cotton has been replaced in many instances by maize, which yields three crops, each of 30 to 50 bushels per acre, in the course of

thirty-four months. The plantations of coco-nuts are being extended, and coffee plantations have also been laid out. The imports for the three months ending the 31st of December 1874, amounted to 31,545*l.*, the exports to 27,586*l.*, the latter (including 525 bags of beche de mer, 1861 bags of copra (kernels of coco-nuts), 10,000 coco-nuts, 1883 dholes fibre, 86½ tons of coco-nut oil, 434 tons and 724 bags of cotton, 6 cases of tortoise-shell, 10 tons of sandal-wood, besides small quantities of beans, sugar, pea-nuts, tallow, hides, timber, and wool.

The Mean Height of the United States.—The 3rd edition of the "Lists of elevations principally in that portion of the United States west of the Mississippi River," by Henry Gannett of the United States Geological Survey of the territories, carried on under the efficient direction of F. V. Hayden, not only contains lists of numerous altitudes, but likewise an estimate of the mean elevation of twenty states and territories. The results obtained by Mr. Gannett are as follows:—

	Feet.		Feet.
Washington	1800	New Mexico	5400
Oregon	2700	Dakota	1950
California	2800	Nebraska	2550
Montana	3950	Kansas	1780
Idaho	3800	Indian Territory	1250
Wyoming	6450	Texas	1870
Nevada	4900	Minnesota	1050
Utah	5100	Iowa	925
Colorado	6600	Missouri	800
Arizona	4200		

The area of these states and territories amounts to 2,126,101, and their mean height has been computed by us, from the figures given by Mr. Gannett, at 3130 feet. Spread uniformly over the whole of this area Colorado contributes 313 feet, New Mexico 309 feet, Montana 267 feet, Nevada 258 feet, California 246 feet, Texas 240 feet, &c. We shall probably not be far wrong if we assume the mean height of the eastern portion of the United States (900,393 square miles) to amount to 800 feet. The mean height of the whole of the states would consequently be about 2470 feet. That of Europe has been computed by Mr. Leitpold at only 974 feet (see *Geographical Magazine*, 1875, p. 185).

Obituary.—Sir WILLIAM E. LOGAN, F.R.S., late Director-General of the Geological Survey of Canada, died last June, at Pembrokehire, at the age of 77 years. The deceased was born in Montreal in 1798, but received his education at the High School and University of Edinburgh. At the age of 20 he entered the commercial house of an uncle in London, but devoted all his spare hours to geological science. His earliest publications refer to the coal-fields of South Wales and the West of England. In 1841 he visited the coal-fields of Pennsylvania and Nova Scotia, an account of which he rendered to the Geological Society of London, and in the same year he communicated an important paper on "The Packing of the Ice on the St. Lawrence, and on the modern deposits of the valley of that river." In 1842 Mr. Logan commenced an examination of the palæozoic rocks of Canada, and in the following year he accepted the post of Director-General of the Geological Survey instituted by the Colonial Government. In that office he rendered great service to geology and geography, in recognition of which he received the honour of knighthood in 1856.

GENERAL W. H. DUFOUR, chief of the Swiss General Staff, died on the 14th of July, at Geneva, at the ripe age of 88. To geographers he is best known by the magnificent topographical maps of Switzerland, which were brought out under his direction.

LADY FRANKLIN, the wife of the Arctic navigator Sir John Franklin, died on the 18th of July, at her house in Phillimore Gardens, aged 83.

Correspondence.

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MR. SKERTCHLY ON THE OGOWÉ.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I write to correct some mis-statements which appeared in the *Academy* of May 1st, regarding a journey of exploration in Equatorial Africa, alleged to have been made in 1868, by Mr. J. A. Skertchly.

In the first place, I declare most positively that Mr. Skertchly was not in Gaboon at all in 1868; and secondly, I deny that he made any journey of exploration in the Gaboon and Ogowé either in 1868 or in any other year. In proof of these assertions I will state a few facts, leaving Mr. Skertchly to refute them if he is in a position to do so.

In January 1870 the barque 'Oricle' was loading in Liverpool a cargo consigned to myself for trade on the West Coast of Africa, and Mr. Skertchly, who was employed by some gentlemen in England to proceed to Gaboon for the purpose of collecting bird-skins, and other specimens of natural history, applied to the owners of the vessel to be allowed to take his passage in her, but his request being refused, he proceeded by mail steamer to Fernando Po, from which place he obtained passage to Gaboon in the schooner 'Maria,' Captain J. E. Holt, on the strength of letters of introduction to me from Mr. H. W. Bates, Assistant-Secretary to the Royal Geographical Society, Mr. R. B. Sharpe (now of the British Museum), and Mr. E. Higgins, the well-known natural history agent of 24, Bloomsbury Street. Mr. Skertchly arrived in Gaboon in February 1870, and (in my absence) obtained a footing in my factory at that settlement, somewhat against the will of my representative, who suggested, but unavailingly, the propriety of the letters of introduction being first presented to me, and my sanction obtained by the bearer to take up his residence in the establishment. Mr. Skertchly seemed in no hurry to make my acquaintance; but as I was informed that he was going out to Gaboon, that he was to receive a grant of 400*l.* from the Royal Geographical Society, and was authorised by the Council to demand from me the instruments lent me by the Society in 1865, I at once wrote to Mr. Bates to make enquiries, and was informed in reply that the Royal Geographical Society had neither granted any money to Mr. Skertchly nor intended doing so, and that he was not empowered by the Society to receive from me the instruments in question.

After much persuasion, Mr. Skertchly acceded to the request of my factor in Gaboon, and came round to see me at Eloby. During his brief visit to me, I spoke to Mr. Skertchly of my journey to the Ogowé in 1868, and of the information I had there obtained from the natives as to the upper course of that little-known river, on which he has probably founded his account of his imaginary exploration. From Eloby he returned to my factory at Gaboon, where he remained some little time longer, until the gentleman in charge, Monsieur G. Jobet, insisted upon his quitting it. He shortly afterwards obtained a passage to Fernando Po in the schooner 'Janette,' and thence returned to England by mail steamer, without having in any way "explored" the country.

During the few months of Mr. Skertchly's stay in Gaboon, he made a few trips up the river in the schooner 'Eloby,' attached to my factory, and that was the full extent of his "explorations." On these occasions he was never more than a few miles away from the vessel, nor did his absence from the factory ever exceed fifteen to twenty days; in fact, he was nearly always in the company of the master of the schooner, who being engaged in trading with the natives, could not leave his ship for any length of time. It is utterly untrue that Mr. Skertchly penetrated to 15° E. longitude, or even crossed from the Gaboon to the Ogowé, as I am the only Englishman who has yet accomplished the latter not very important feat, which I did in February 1866, having been preceded some time before by MM. Genoyer and Serval, of the French Navy. Quite recently, my friend the Rev. Dr. Nassau, of the American Mission, has crossed from the Ogowé to the Gaboon. In 1866 I ascended the Ogowé to about 11° East longitude, and in 1873 I succeeded in reaching nearly 12° E. being the first European to attain the rapids, which I did, not only on the main stream of the Ogowé, but also on its affluent, the Ngunié. In 1874 MM. de Compiègne and Marche explored the Ogowé some distance beyond the spot at which I was compelled to turn back from want of time to proceed further. Those gentlemen made important discoveries, and penetrated to about 12° 40' E. longitude, where their further progress was barred by the hostility of the natives: that is the farthest point yet attained by Europeans, and for which journey MM. Compiègne and Marche have recently been awarded a medal by the "Société de Géographie" of Paris. At present two German travellers, Dr. Lenz and the Baron von Koppenfels, are engaged in exploring the Ogowé, as is also Dr. Nassau; and I believe that a French officer, Monsieur Savorgnan de Brazza, is about to undertake an expedition for the same purpose, so that something more will shortly be known of the upper course of that important but long-overlooked river, which very possibly has some connection with the Lualaba, and almost certainly proceeds from one of the vast central lakes. Mr. Skertchly is not, however, likely to give us much information on the subject, all that he can tell being mere hearsay.

Messrs. Bates, Sharpe, and Higgins will, I am sure, if asked, confirm my statement as to the year of Mr. Skertchly's abortive visit to Gaboon; they can also, probably, tell where he was in 1868. I can likewise refer to Messrs. Holt, of 7, Dale Street, Liverpool, and of Fernando Po and Gaboon, as well as to numerous other persons, if necessary, to confirm my contradiction of the glaring mis-statements concerning Mr. Skertchly, which I venture to characterise as a gross attempt to impose not only on the *Academy* but on the public. As I hope to be in England in the course of a few weeks, I shall then be prepared to maintain the correctness of what I now write.—Yours, &c.

R. B. N. WALKER, F.R.G.S.,
FUNCHAI, *Membre Donateur de la Société de Géographie de Paris.*
June 10th, 1875.

P.S.—If Mr. Skertchly had really made so important a journey under the Equator as he pretends to have done in 1868, how does it come to pass that he has for so long a time hidden his light under a bushel? Why did he not make his discoveries known to the Royal Geographical Society, and to the world at large? There was no such delay in publishing his Dahomey experiences, and surely the fact of having penetrated to 15° E. longitude, in an entirely unknown region, and of having there made such important discoveries as the existence of Arabs (!), and the possibility of passing from the Ogowé to the Congo by boat, was more new and interesting than descriptions of Dahomey court ceremonies, &c. Where did Mr. Skertchly obtain his instruments, and when did he learn their use, so as to determine the longitude so accurately?

R. B. N. W.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of June 28th, 1875.

WESTERN AUSTRALIA.

SIR HENRY RAWLINSON took the chair at 8.30 P.M. The first paper of the evening was by Mr. John Forrest on his journey across the Western Interior of Australia. He first gave a sketch of his former journeys, the first of which was undertaken in 1869, with the object of exploring eastward and discovering some trace of Leichhardt's remains (in the course of which journey he reached latitude $28^{\circ} 41' S.$ and longitude $122^{\circ} 50' E.$, but without finding any trace of the lost party), and in the second of which, in 1870, he journeyed round the Great Bight, an exploit which has led to the construction of a telegraph line, connecting Western Australia with the telegraph system of the world. His most arduous task was his last one. Just before commencing it he had received a brief account from the Surveyor-General of Western Australia of Colonel Warburton's expedition, which did not cheer him much, especially as the Colonel had been supplied with camels which can go for ten or fourteen days without water, while horses, of which he had only a very ordinary lot, require water every day. On the 1st April, 1874, the expedition left Champion Bay. Mr. Forrest's account of his progress thence was as follows:—

I was very sanguine of being able to accomplish what I had undertaken, but never expected to encounter such obstacles and difficulties as we afterwards did. I had no idea of any such large extent of country so utterly wretched. We reached Mount Hale, the farthest point known on the Murchison River, without much difficulty, and had a very pleasant time until we reached the watershed of the river in longitude 120° .

Travelling on, along grassy alluvial flats, with nice pools of water here and there, with ducks numerous and kangaroos plentiful, we thought we were going to have a splendid journey, and little knew what was in store for us on the other side of the watershed. I had anticipated finding a river running to the east; but when we arrived at the watershed, which I named the Kimberley Range, I found it was only a low rise, with a few dry watercourses leading from it, and, instead of a river running to the east, we had not gone many miles before we entered a spinifex desert, which lasted, without any break worth mentioning, for 600 miles.

Most of you present may have heard of the spinifex desert, and I will try to explain what it is like. As far as you can see in every direction stretch plains of apparently ripe corn, which is the grass or stalk growing out of the spinifex tufts. Spinifex is very sharp, and on that account is commonly called Porcupine Grass: it is the *Festuca irritans* of botanists. The grass is very disagreeable to walk through, and often makes the horses' legs bleed: when dry, horses will not and cannot eat it; the grass or stalk is so dry, and entirely without nutriment. Day after day, week after week, and for months, we fought against it; and in this fearful country, whichever way we turned, all was the same. A few grassy valleys of very small extent were sometimes crossed. One of these, in latitude 25° , longitude $121^{\circ} 21' E.$, in which we discovered a magnificent spring, named by me the Weld Spring (after our Governor, who has been such a great supporter of exploration), is a very delightful spot. Abundance of water, game of every description, kangaroos and emus numerous, and pigeons innumerable; it certainly was a delightful break in the frightful monotony of our journey, an oasis in the desert. We were obliged to halt here three weeks, while we searched for water ahead; during the time we were attacked by fifty or

sixty armed natives, and were compelled to fire on them. There were only four of us at camp when they attacked us. On two other occasions during our journey we were attacked; the first by about twenty, and the last by about a hundred natives. Each of the three times we had to fire on them; and although some were wounded, as far as we know, none were killed. We were now in the very heart of the desert; great care was necessary in moving on, and our horses were getting very poor. Our course of procedure was as follows:—

Myself and a native would leave camp where there was water, and go ahead in search, leaving instructions for my brother to follow with all the party, one, two, or three days after us, as we thought expedient. Should we find water, we would rest until he overtook us, as he would follow our horses' tracks, and this would save us the trouble and labour of returning to bring them on. On the other hand, if we were unsuccessful, we had sufficient time to return and meet them before they got into any serious difficulty. On many occasions we found enough for our own two horses, but not sufficient for the main body of the party.

Our daily life during the six months we were away from civilization was as follows:—We had breakfast before daylight, being awakened by the man on watch (one always kept watch regularly in turns, two hours each), who would have the tea made if there was any water. At peep of day four of us went to collect the horses, which were often a long way off, leaving two at camp to pack up and get everything ready for saddling. As soon as the horses were collected, we saddled up and continued on. We had to walk in turns the whole way, as our horses were too poor to carry us, the whole distance being nearly 2000 miles.

It would serve no good purpose my giving you a more detailed account of our troubles and labours in this miserable country; suffice it to say we got through it by the middle of August, and sighted the hilly country ahead that had been formerly visited by Mr. Gosse and Mr. Giles. Up to this time we had only lost two of our horses; but before we reached the Telegraph Line, owing to heavy travelling and scarcely any food, our losses were six. One poor old horse bore up wonderfully until within sight of the Telegraph Line, when he fell down and died in less than a minute: he died in harness like a good soldier.

The season was one of such great drought that, as soon as I got fairly on the tracks of the South Australian explorers, I determined to lose no time in reaching the settled districts. No rain had fallen since Mr. Gosse was here the previous year, and we had considerable difficulty in many places, owing to the water being dried up, and our depending too much on expecting to be able to stay where he had stayed. However, by continually moving on, we reached the Telegraph Line on the 27th September, and the Peak Telegraph Station (which is 636 miles from Adelaide) on the 30th.

We had about 60 lbs. of flour remaining, having finished everything else, and had abandoned about 300 lbs. of flour besides all the baggage we could possibly do without. We had been living chiefly on bread and water for about a month, except when we were fortunate in shooting game.

All our troubles were now over: we travelled down slowly towards Adelaide, and had quite a triumphal march all through South Australia. On our return to Western Australia we were received with much enthusiasm.

The natives we met with were very similar in habits and appearance to all others I have seen in different parts of the interior of Australia. They are entirely without clothing, and sleep with a fire on each side of them, without any hut, unless in very wet weather, when they make a very poor shelter with wood and thatched with grass. There are a good many of them even in the worst spinifex country, in which much wallaby exists. It may be thought by many that there must be

plenty of water where there are natives, but it is not so. A native does not wash or cook with water, all he uses it for is to drink; therefore a small rock-cavity, with say from 20 to 100 gallons, will suffice a long while for a number of them, and they cover it up to keep it from evaporating; but that quantity goes a very little way with fifteen or twenty horses. The natives, again, know every little waterhole and spring; whereas we had to look for it, and might sometimes pass it. I have no doubt that there are no parts of Australia, or scarcely any, that you could not travel over easily if you knew every watering-place; but an explorer has to find all these places, and hence the difficulty. With us the guide to water was the encampments of the natives, the tracks of emus, and those of the natives themselves; the flight of birds, such as pigeons, especially in the evening, was also an indication. Emus, however, I think were our best guides, as they are birds which must have water regularly. The natives sometimes go a long distance away from water, and get it from the roots of a species of Eucalyptus, called Mallee Scrub. They choose the roots, break them in lengths of about a foot, and stand them on end, when all the moisture drains out into a wooden dish. The traveller meets with great heaps of these roots, and it is a bad sign when in search of water.

Regarding the character and capabilities of the country we travelled over, it should be remarked that a great deal of the country from the west coast to the watershed of the Murchison is admirably suited for pastoral settlement, and is already being taken up and stocked; but after crossing the watershed as far as longitude 128° E., I do not think it will ever be of much use. The whole of this immense tract is a slightly undulating spinefex desert, and the prevailing rock is the tertiary desert sandstone. From longitude 128° to the Telegraph Line the country is in many places beautifully grassed, and most of it has been taken up already by the South Australians. But, perhaps, the greatest result of the expedition has been the addition to our geographical knowledge of the country. The western half of Australia has now been traversed from east to west, through the centre along the 26th parallel, and all theories as to the nature of the interior of the vast continent are finally set at rest.

As regards the future exploration of Australia, there is comparatively very little more to be done: all the geographical problems have now been finally solved, and the only remaining portion of interest is the small part in the north-west corner from Roebuck Bay to the Victoria River. This would be a very interesting expedition, as there are some fine rivers to be examined, amongst them the Fitzroy and the Glenelg. You would be certain of having good country to travel through, and would most probably accomplish all you would set out to do, viz., to examine all the country to the west of the watershed of the rivers running into the sea. In my opinion, this is the only part of unexplored Australia that is worth examining. I am sorry to see the energy of Mr. Giles, under the auspices of Mr. Elder, of South Australia, almost thrown away in examining a country, the character of which is tolerably well known, between the explored portions of South and Western Australia, keeping to the south of latitude 30° S.

Australian discovery has made very rapid strides within the last few years, and I feel convinced the day is near at hand when the whole of the available country of Australia will be occupied and stocked.

Sir G. BOWEN said that, having been for eight years Governor of Queensland, which occupies on the eastern coast of Australia a position similar to that of Western Australia on the opposite coast, no one could appreciate more highly than he did the service rendered by Mr. Forrest to the colonies. When he first went to Queensland some 500 miles of coast only were settled, *i.e.*, from Brisbane to Rockhampton; but now a chain of flourishing settlements extended 1200 miles further up, to the Gulf of Carpentaria. Queensland was richer in coal,

iron, and gold than Western Australia; but this latter colony had also many advantages, and might ultimately attain the same success as Queensland had already arrived at.

Mr. LEAKE (Speaker of the House of Representatives, Western Australia) enumerating the important explorations in which Mr. Forrest had been engaged, said that his first journey to Lake Barloe, in search of the remains of white men reported to exist there, and supposed to be those of Leichhardt and his party, quite settled that question, and proved that Leichhardt had not passed that neighbourhood. On his second expedition he accomplished the great feat of travelling from King George's Sound along the coast of the Great Bight to South Australia. In this, as in previous undertakings, he did his work well, and rendered great service to geography and to the colony. His discoveries had led to a large portion of the country being settled, and the neighbourhood of Eucla in the Bight was now largely stocked, the only difficulty being the want of water; but no doubt, as in other parts, permanent springs would be found when settlements were established. By his last expedition from Champion Bay to the Telegraph Line at Peake Station he had also done good and useful work. He had travelled with his brother and four assistants, two of them being natives, and twenty-one horses, right across the sandy desert, and thus accomplished a journey which had scarcely ever been surpassed. The result of the expedition was to show that nothing could be hoped for from the central districts. However, on the boundary of the Telegraph Line of South Australia, and on the west coast after leaving Champion Bay in a north-easterly direction, there was a large quantity of good land which was now being taken up, and afforded as fair a field for settlement as any other in the colony, if people would only go there with energy and capital; and indeed he believed West Australia might be made to surpass both South Australia and Queensland. In the neighbourhood of Champion Bay was the Murchison River, and a little south of that the Irwin. The whole of that country was one mass of minerals, and sooner or later must become very valuable. The district of Shark's Bay abounded in pearls, many thousand pounds' worth being sent to England annually. The shell, however, was not very valuable, the mother-of-pearl being so small; but farther north, near Exmouth Gulf and Nicol Bay, the most magnificent pearls and pearl-shells were found. These were collected principally by Malays employed by colonists, the shell being worth upwards of 300*l.* a ton. The exports of West Australia had doubled during the last three years, and the imports had increased proportionately.

Mr. TOMKINSON said that he, as a South Australian, could endorse all that Mr. Leake had stated with regard to the capabilities of West Australia.

Mr. DAINTREE, referring to the desert sandstone which was so abundant in the districts traversed by Mr. Forrest, said he had seen the outliers of that sandstone throughout a large part of Queensland, and he was satisfied that during the Tertiary epoch almost the whole of that colony had been covered with it. Had it not been for the denudation caused by the rivers running east and north, there could be no doubt that at the present time it would still be a desert, similar to that passed over by Mr. Forrest.

His Highness the Sultan of Zanzibar and suite, accompanied by the Rev. Dr. George Percy Badger, Dr. J. Kirk, H.B.M. Consul-General and Political Agent, Zanzibar, and Clement Hill, Esq., entered the hall amid the acclamations of the audience.

The PRESIDENT said, I have now the pleasure of introducing to the Society the Sultan of Zanzibar. He has been an honoured guest everywhere in England, as you know, but in no place is he more welcome, I am sure, than in the Royal Geographical Society, he having been an Honorary Member of our Society for several years, and having also on all occasions, whenever an

opportunity occurred, conferred upon us very essential service in forwarding geographical research. It was owing to his Highness's assistance that we were able to send our Relief and Search Expedition for Livingstone into the interior of Africa, and on every occasion he has shown the utmost good will and energy in assisting us. I would only further remind you, ladies and gentlemen, that the friendship of the Seyyid's family with England is not a thing of yesterday. It was in the first year of this century that Sir John Malcolm made his first treaty with the grandfather of the present Sultan, and from that day to the present, throughout the long fifty years of his father's reign, the family has always behaved with the most unswerving loyalty to the British Government. His Highness has shown the utmost desire not only to further the political interests of England, but also to protect trade; and latterly, as you are aware, to facilitate the measures which we have thought it proper to introduce for the suppression of the slave trade. On all these grounds his Highness Seyyid Burghash certainly deserves well of this country, and especially of the Society of which he is an Honorary Corresponding Member. And let it be remembered that the Geographical Society is, I believe, the only society in England which has the honour of having his Highness enrolled amongst its members. I had hoped that Sir Bartle Frere, who was lately sent out by her Majesty as Envoy to his Highness, would have been present; but as he has been unavoidably detained, I will ask General Rigby, who for many years was Political Resident at the Court of Zanzibar, briefly to point out upon the map the situation of that country and to give you in a few words the result of his experiences.

GENERAL RIGBY pointed out on the map the portion of East Africa ruled over by the Sultan of Zanzibar. He said that it entirely depended upon the good government of Zanzibar whether the interior of East Africa should be civilized, and its trade opened or not. The Zanzibar dominions extended from about $2\frac{1}{2}^{\circ}$ N. to $10\frac{1}{2}^{\circ}$ S. A number of large rivers flowed through it, such as the Pangani, the Rufigi, the Juba, and others, and opened up communications with the interior. Probably there was no part of the world that had a richer soil or was better adapted for trade than the east coast of Africa, and it was entirely owing to his Highness Seyyid Burghash and his predecessors that this country was now settled and comparatively civilized. Its trade was increasing and becoming of greater importance to Europe year by year. For many staple articles of trade Europe now depended almost entirely on the Zanzibar dominions. These dominions had the largest trade in ivory in the world; they supplied all the carriage-varnish gum-copal, of which there was an inexhaustible supply; and almost the entire supply of cloves in the world came from Zanzibar, although it was only recently that cloves had been grown there. Before they were cultivated there, cloves cost from 2s. to 4s. per pound, whereas now they could be bought for 4d. or 5d. Within the last ten or fifteen years a vastly increasing trade has sprung up in gums, spices, sugar, cotton, grain, and various other articles; in fact, there was no limit to the production of the Zanzibar dominions. His Highness Seyyid Burghash had done all in his power to open up the country, and would still continue to do so, to his own benefit and the benefit of the world.

Dr. BADGER then read the following translation of the reply to the President's greeting, which his Highness had placed in his hands:—

"Mr. President, my ladies, lords, and gentlemen,—
"Our gratification overflows at meeting this honourable assembly, and we thank you heartily for the generous welcome which you have given us, and which we ventured to anticipate from your famed courtesy. We have heard wonderful accounts of the proceedings of this Royal Society in all parts of the world; but we have also ourselves seen and known much, and learned

more, from our beloved friend, John Kirk, of its explorations of Eastern and Central Africa, especially through their distinguished and indomitable explorers, Burton, Speke, Grant, Livingstone, Stanley, and Cameron, who braved many and great dangers in order to make known to the world what was before unknown respecting the land of the Great Lakes, and who have given us correct information of those parts which, albeit reckoned under our rule, we knew little of except by untrustworthy report. There can be no doubt that these researches will lead the way to many advantages, and will result in the eventual civilization of those large districts, and the extension of commerce, to the benefit of all concerned. In our little way we have endeavoured to forward these researches in the midst of great difficulties, which have not always been appreciated. All we would now say is, that we have done what we could, and that by the aid of God in the first place, and next through emulation of what we have seen in this country, stimulated thereto also, by what we see before us this evening, and particularly because we have been honoured by having been made a member of this Royal Society, we shall do our best, God helping us, to further its useful objects. Several Arabian poets have dilated on the advantages of travel; and since our arrival in England we have been convinced of the truth of their statements. This Society, by making generally known the peculiarities and productions of different countries, together with the habits and customs of their inhabitants, must contribute largely to the instruction, the pleasure, and the benefit of mankind at large. We desire once more to reciprocate your kindly greeting, and to express towards you all whatsoever good will and happiness you have expressed for us."

Dr. KIRK said he could add but little to General Rigby's statement with regard to Zanzibar. Respecting the travellers who had gone into the interior, no positive information had been received for some time from either Mr. Stanley or Lieutenant Cameron, but he had no doubt they were advancing safely. Mr. Stanley, when his last letters were despatched, had reached Ugogo, and had gone to the north towards Victoria Lake. Lieutenant Cameron, when last he was heard of, had reached, for the second time, the western shore of Tanganyika, whence he would follow up Dr. Livingstone's discoveries in the Manyema country, and if possible pass down the Congo. From what was known of his character and the admirable way in which he had organised his expedition from Ujiji, and conducted the circumnavigation of the lake, there was very little reason to doubt that he would accomplish his object. The Zanzibar mail had that day arrived, but no mention was made of the explorers in his Highness's letters, and his Highness therefore concluded that all was going well with them.

Dr. BADGER said that his Highness desired him to say that all he had heard about Lieutenant Cameron went to show that he was received everywhere with great kindness by the people, and was making his way famously. Those who should hereafter be sent out by the Royal Geographical Society for the exploration of Eastern Africa would always receive his Highness's best assistance, for his wish was to consider England and his own dominions in Africa as one and the same country.

After a few words respecting the domestication of the elephant in Africa, the Sultan and his suite retired.

Dr. CARPENTER then read a paper on recent observations on ocean temperatures, made in H.M.S. 'Challenger,' and U.S.S. 'Tuscarora,' with their bearing on the doctrine of a general oceanic circulation.

Dr. CARPENTER said the data afforded by the deep-sea temperature reports sent home by the 'Challenger,' and those taken by the 'Tuscarora' in the North Pacific, afforded much interest in their bearing upon the doctrine of a general oceanic circulation, a theory which he had before had the honour of bringing before the

Royal Geographical Society. The *rationale* of this theory would probably be further tested by the researches of the 'Challenger' in the North and South Pacific Oceans.

On leaving the Cape of Good Hope, the 'Challenger' proceeded in a zig-zag and pretty nearly S.E. direction to Kerguelen Land. The first serial sounding taken soon after leaving Cape Town, showed in a very marked degree the influence of the Agulhas Current, which may be considered as an extension of the Equatorial Current of the Indian Ocean, slanted to the S.W. by the coast-line of South Africa. The current was setting W.S.W., and its surface-layer temperature was 73°, an excess which was found to continue during a run of 230 miles to the S.S.E., and then suddenly disappear.

January was spent in an examination of Kerguelen Land and Heard Island, with a view to ascertain their suitability for Transit Observation stations. The climate of Kerguelen Land at the midsummer of the southern hemisphere, proved to be very like that of England in winter, but it seldom freezes at the level of the sea even in winter. Heard Island to the south-east of Kerguelen's Land, near the parallel of 53° S., consists of two enormous glaciers, the spurs of which even in summer extend down to the beach on both sides of the island. The temperature during the stay of the party ranged between 39° and 36°, which is the same as the temperature of the surface-water, and therefore a correct indication of the mean for the time of year.

Thus the surface temperature of the Southern Indian Ocean in summer is 18°, or 20° F. below that of the North Atlantic under the same parallels; but there is not by any means the same difference in winter, the southern isotherm of 41° F. shifting only about three degrees of latitude nearer to the equator, while the corresponding northern isotherm moves at least ten degrees to the south. On the other hand, the surface-temperature of the Southern Indian Ocean seems to correspond very closely, alike in summer and winter, with that of the South Atlantic under the same parallels. Dr. Carpenter then drew attention to certain circumstances which proved that the current, attracted by the Arctic indraught, narrows and deepens the bulk of its waters as it moves northward, while the corresponding stratum to which the Antarctic in draught imparts motion, from the Tropic of Capricorn towards the South Pole, will be continually widening out as it flows, and will therefore be constantly *diminishing* in thickness. Now, as the surface-temperature in high latitudes is far more influenced by the thickness of a moderately warm sub-surface stratum, than by any elevation in the temperature of a thin surface layer, which is liable to speedy reduction under the influence of a low atmospheric temperature, it is probable that the low temperature of the Southern Indian and South Atlantic Oceans, with the consequent depressing influence on the climate of the small islands scattered throughout those oceans, and on the position of the Antarctic ice-barrier, is mainly due to the lateral extension, and consequent thinning-out of the Poleward upper-flow; while the relatively high temperature of the North Atlantic under the same parallels, with the amelioration it produces in the climate of the British Islands, the Faroes, the coast of Norway, &c., would appear to be mainly attributable to the lateral compression, and consequent increase in depth, of the Poleward upperflow, which further carries with it an excess of temperature imparted by the Gulf Stream to the Mid-Atlantic, in which it loses itself.

From Kerguelen Land, the 'Challenger' proceeded southward, for the purpose of sounding and dredging on the border of the Antarctic ice-barrier. The result of this and other soundings in proximity to the ice showed that the superficial stratum was cooled down, by the melting of ice, to several degrees below the subjacent stratum on which it floated, in virtue of its reduced salinity. As there is no question of any "Gulf Stream" in the Antarctic area, Dr. Carpenter ventured to think that

the presence of this warm underlying stratum affords conclusive evidence of a general Poleward movement of the upper stratum of oceanic water.

The soundings subsequently taken by the 'Challenger' in different parts of the Eastern Archipelago confirm, in a most remarkable measure, the theory that when a deep basin or depression of water is shut out from the surrounding ocean by a ridge, the temperature of water in the basin corresponds with that of the outer ocean till one reaches the level of the ridge, and that then no alteration takes place till the bottom of the basin is reached. This was further confirmed by some remarkable soundings taken off the north coast of New Guinea. Here depths of 4475 and 4579 fathoms were proved, and the only one of the four thermometers sent down which withstood the tremendous pressure of nearly six tons on the square inch, recorded a bottom temperature of 34°.5 F. As this temperature was also recorded at a depth of 1500 fathoms, there was here a stratum of 3000 fathoms in thickness, having a uniform temperature of 34°.5, which is obviously the temperature of the coldest water that can find its way into this extraordinary depression. Thus it appears that the temperature of any sea-bottom will depend upon the depth at which its area communicates with some other, into which the glacial underflow streams without interruption from one of the Polar basins.

The 'Tuscarora' was sent out by the United States Government, not with a view to scientific research, but for the purpose of determining by deep-sea sounding the most practicable route for a submarine cable between the Pacific sea-board of the United States and Japan. In addition to ordinary bathymetrical determinations, bottom-temperatures were everywhere taken with "protected" thermometers; and the thermal stratification down to about 600 fathoms was also systematically determined by serial soundings. A very important body of facts has been thus collected in regard to the thermal condition of the North Pacific along the two lines examined;—viz., the Southern route, passing directly across between the parallels of 20° and 30° N. latitude, from San Diego in California, by way of the Sandwich Islands, to the Bonin Islands, and thence northward to Yokohama; whilst the Northern route followed a great circle-course from Yokohama along the line of the Kurile and Aleutian Islands to Cape Flattery, the northernmost point of the United States territory. The observations taken along the northern line appear to point out that in the North Pacific there is the general want of that sub-surface stratum of above 40° F., which in the North Atlantic under the same or yet higher parallels has a thickness of at least 500 fathoms. The true cause of this peculiarity is that the North Pacific derives its deep stratum of glacial water, which nearly fills its basin, from the Polar area of the opposite hemisphere, the inlet at Behring's Straits being too narrow and too shallow to admit a flow of water of any appreciable importance. This northward flow of water from the Equator must have as its complement a movement of the superficial stratum from the northernmost limit of this flow towards the Equator, and thence towards the Southern Pole. The glacial current when it reaches the North Pacific comes nearer the surface than it does in the Southern Ocean, even in higher latitudes, and this, modifying still further the reflux surface flow towards the Equator, would appear to account for the well-known moderation of the Sandwich Islands climate, though they lie within the tropic of Cancer.

As regards the eight soundings run off and on the American shore between 48° 20' N. and 37° 40' N., the sections obtained correspond with those taken along the western shore of the European continent, showing that within a small distance from the present shore-line there is a very rapid descent of the bottom, the oceanic basin soon showing a depth that approaches 2000 fathoms, with steep sides. The Sandwich Islands themselves rise abruptly from a vast depression in the North Pacific

Ocean. From a consideration of the bottom brought up by the soundings, a great portion of which was coral, it appears very probable that the vast area between the Sandwich Islands and Japan has been one of great and rapid subsidence within a very recent epoch, for it is impossible to account for the uniform presence of coral, unless we admit that each of the elevations had been—if not above the surface—sufficiently near to it to allow the reef-building corals to live, the normal limit of their depth being fixed by Darwin and Dana at about 20 fathoms.

Along the northern route, commencing from Yokohama and proceeding N.E., the 'Tuscarora' made three ventures to select a favourable line for laying a cable. Each renewed attempt was made nearer land, but in spite of this the depth proved too great and too irregular to be suited for a telegraph cable. She then sailed into Behring's Sea and proceeded along the northern shores of the Aleutians, emerging into the Pacific through Ounimak Straits to the south of the Alaskan Peninsula, where a depth of 3664 fathoms was sounded; but from this the bottom rapidly rose, as the vessel sailed along a great circle course towards Vancouver's Island. A sudden elevation (apparently a continuation of the ridge which forms Queen Charlotte's Island) then presents itself; within this the bottom again deepens to more than 1300 fathoms, and then rapidly rises as in the other sections taken along the North American coast.

The PRESIDENT said that it was upon such papers as that which Dr. Carpenter had prepared that the scientific reputation of the Royal Geographical Society amongst Continental nations depended. If it was merely a society to register personal adventures, or the ordinary run of travellers, it might be a Geographical Society, but it would not be a scientific Geographical Society. When, however, serious problems of physical geography, such as Dr. Carpenter had solved, were considered, the Society fulfilled those functions for which it was really constituted.

FRENCH GEOGRAPHICAL SOCIETY.—*Meeting of 2nd of June, 1875.*—M. Delesse in the chair. A letter from the Abbé Desgodins was read, dated Bathang, in Tibet, the 15th of January, 1875, and containing geological and meteorological observations made in his journeys between Yerkalo and Bathang.

The Abbé Bouche communicated some notes on the slave coast, from which it appears that Atakpame is the most important town of the different states between Dahomey and the Volta. The town is surrounded by dense forests, and has further defences in the shape of mountains, which hem it in on every side. The inhabitants are pretty skilful in the use of the bow and musket, and enjoy a reputation for being good hunters. The natives of Ahgwey, Great Popo and Little Popo, often repair to Atakpame to dispose of salt, flints, gunpowder, and other commodities; ivory forms the chief export, and this is usually tendered in exchange for gold, which the inhabitants make up into ornaments. There are no towns of importance between Atakpame and the sea; on the coast is Little Popo, a town upwards of 200 years old, and to the north-east of it there is a settlement called Ajido, belonging to the Souza family, which claims direct descent from the Portuguese negro Antonio Felix de Souza, who was the father of 345 children. Ataunde, the governor of Ahgwey, has been in power since the beginning of 1874: he is an agreeable, intelligent, and energetic official, with clear notions of common sense and justice. The population of Ahgwey consists of from 5000 to 6000 souls, of which about two-thirds are foreigners. The coast lands are sandy and unproductive, but north of the Lagoon the country is fertile. Ahgwey can never attain much importance, as there are no means of easy communication with the interior, and in a country where camels and oxen are unknown as beasts of burden, and horses are very rare, and where all goods are carried on the head, this is a

fatal obstruction to commercial development. The negro policy, too, of creating a monopoly of trade for the coast acts injuriously against attempts to open up the country.

An account was then given of M. Raffray's recent explorations in Abyssinia and the East Coast of Africa. This gentleman left Toulon on the 20th of July, 1873, and being entrusted with a scientific mission by the minister of public instruction, repaired to Massowah, with the object of making zoological researches along the coast-lands. He set out inland from Massowah on the 13th of August, and soon reached Asmara on the African table-land, from whence he made his way along the caravan route to Adowa, the capital of Tigre. On the 20th of October he left this town for the south, passing those curious bluff, terraced mountains called Ambas, on the summit of one of which Ras-Golassieh is said to be held prisoner, by his former rival Ras-Kassa, who rules over the country. After traversing mountains of basaltic formation, M. Raffray arrived at Sokota.

From Sokota numerous caravans journey into the Gallas country, and convey thither the lumps of salt which pass for currency in these parts. The church of Ugwere near Sokota deserves notice, being cut out of a single block of granite, in the side of a mountain. After leaving Sokota, M. Raffray descended by the Bambur Valley to the banks of the Takazze River, a stream abounding in crocodiles. After crossing the river into Begemeder the aspect of the country changed from rugged ravines and valleys, with perpendicular sides, to wide valleys and undulating ground. He soon came up with the King Johannes at Gelandios, and was hospitably received by the monarch, who was on his way to punish Ras-Adal, the rebel governor of Godjam. In company with the king and his army, M. Raffray crossed the Blue Nile, which was there upwards of 200 yards wide, and swarmed with hippopotami and crocodiles. At Mota he left the king, and after being obligingly provided by his majesty with an escort, travelled northward past Lake Tsana towards Gondar. On his return towards the coast he encountered some fanatical natives, who assaulted him with stones, and compelled him to take refuge in a church. After four days' durance, he managed to make his escape and bore away to the north-east, as the country to the west was in the hands of a rebel. He eventually arrived at Axum, a town tolerably celebrated for its obelisks and ruins, and thence journeyed to Hebo, where some French missionaries received him with great kindness. On the 3rd of April he arrived at Massowah.

M. Raffray then visited the Dhalak Islands, noted for their pearl fisheries, and made his way to Zanzibar by way of Aden. He explored a portion of the interior of the island of Zanzibar, visited Bagamoyo and Mombasa, and ascended the Chimba Mountains, a chain running nearly parallel with the coast. To the north it takes the name of Gerima; the country is there called Uanika, and inhabited by a tribe of Gallas. Habitations are very few and far between; the huts, which are not high enough for one to stand upright in, are made of palm branches and leaves; in them the men pass a life of great indolence, smoking and drinking a species of palm-wine to excess, and leaving the duties of the household and cultivation of the fields to the women. These wear cotton cloths round their waist, copper rings and bracelets on the wrists and ankles, and a heavy necklace of pearls. The men shave the crown of the head, the women do not do so, though they trim theirs very short. Their arms consist of a batch of poisoned arrows in a leathern quiver, a broadsword and a small club. They have no religion, though they believe in sorcery, and even accused M. Raffray of being the cause of a drought which occurred during his stay there. Although suffering acutely from a wound in his leg caused by a poisonous thorn, he was forced to leave, and after fifteen hours' painful travel arrived at Mombasa. After visiting Pemba, he eventually returned to Paris, after twenty-one months' travelling, with a rich harvest of collections.

PARIS COMMISSION OF COMMERCIAL GEOGRAPHY.—*28th May, 1875.* M. E. Cortambert in the chair. M. Challot, French Consul at Syra, in Greece, exhibited a chart showing the submarine cables which unite the Levant with Western Europe and the rest of the world. He also made a useful suggestion that the Foreign Department should endeavour to afford all the assistance in its power to the Commission, by rendering its archives available for reference as far as possible. M. Moll-Schnitzler, Vice-Consul at Dordrecht, presented a set of statistical maps of the Netherlands, and made the welcome announcement that the second Chamber had unanimously voted the abolition of lighthouse and port dues, a measure which when ratified, will be one of the most important events in the commercial annals of the country.

M. Schædelin, a general officer in the service of China, made certain proposals for the formation of a Franco-Chinese company for coast and river steam navigation in China and Tong-kin. The vessels would be commanded by Frenchmen, but would sail under Chinese colours, which would enable them to visit every port. M. Renard received instructions to report on the feasibility of the project.

26th June, 1875.—M. Murand in the chair. A delegate from the United States to the Geographical Congress was introduced, and expressed regret on behalf of United States and Canada merchants that France should procure her cotton manufactures from England, as this necessitated the payment of two commissions, one to the New York house who sell the raw, and the other to the Manchester or Liverpool house. France would do infinitely better to get her manufactures direct.

M. Moxondo, Brazilian consul at Turin, drew attention to the desirability of emigration to Brazil. M. Miguel Tejera defended the Venezuelan Government against attacks upon it in regard to immigration thereto which had been made in a former number of the *Explorateur*. The immigrants into Venezuela are offered the opportunity of enjoying all the rights of citizens, and the increasing numbers of immigrants clearly prove that these advantages are appreciated. Of course, some black sheep had been sent over, and these refused or were unable to work, and so became burthens on the State. M. Farranc said that might or might not be the case; anyhow the French Government had forbidden emigration thither. M. Hertz remarked that the reports on which the attacks on Venezuela Government were based, were of old date, and it might be safely assumed, in the absence of contrary proof, that she had improved in the same ratio as other countries.

A letter was read from Dr. Penot giving some details of interest respecting a high commercial school in Lyons, the object of which is to ingraft a thorough commercial training to pupils who have already received a good elementary education, making them fitted to occupy responsible posts in merchants' houses in different countries.

M. Babinet enquired if this school resembled in any respects the English commercial travellers' schools, where a purely geographical training is given to boys to fit them when grown up for travelling for mercantile houses in foreign countries (!). M. Renaud replied that exceptional importance was not attached to geography in the French schools.

BERLIN GEOGRAPHICAL SOCIETY.—*Meeting of 2nd of June, 1875.*—Baron Richthofen, President, in the chair. Dr. G. Nachtigall read a paper on his explorations in Africa, which have already been fully reported upon in the pages of the *Geographical Magazine*. The meeting was numerously attended, and the reception of the celebrated traveller was of the most enthusiastic description. Dr. Nachtigall is about 41 years of age,

and appears to have suffered but little from the hardships through which he passed in the course of nearly six years' wanderings. The hair of his head and beard are still black, without a tinge of gray, his eyes are dark and piercing, his nose aquiline, and his moustaches of martial dimensions. His stature is small, and he is slimly made, but muscular, his voice is soft and almost monotonous, and he speaks of his achievements with remarkable modesty. The Society has applied to the German Government for a grant, in order that Dr. Nachtigall may be able to elaborate his discoveries and researches at leisure.

VIENNA GEOGRAPHICAL SOCIETY.—*Meeting of 25th May, 1875.*—Dr. F. von Hochstetter in the chair. The President announced the death of Mr. Selleny, the artist of the Novara Expedition, and the award of the Golden Medals of the Royal Geographical Society to Weyprecht and Payer. He then read letters from the Austrian Consul Hansal, describing his journey from Khartum to Lado (Gondokoro) in the company of Mr. Marno, and announcing the speedy return of the latter, who had disagreed with Colonel Gordon. Previously to leaving Lado, Marno and Colonel Long paid a visit to the Makaraka, already known through Dr. G. Schweinfurth. Marno proposes to remain, for the present, at Khartum, and subsequently to start for Dar For.

A letter from Dr. Tietze was then read, describing an excursion to the Sia-kuh, in the salt desert, to the south-east of Teheran. Mr. Julius Payer then read a paper on the effects of the cold during Arctic journeys, and Dr. Breitenlohner described the ice-cave of Kamark, near Leitmeritz.

FRANKFURT GEOGRAPHICAL SOCIETY.—From the annual report of the Verein für Geographie und Statistik at Frankfurt-on-the-Main, we learn that that Society now numbers 334 ordinary members, of whom fifteen are ladies. Its receipts during 1874 amounted to 375*l.*, its invested savings to 271*l.* The society contributed 42*l.* towards the expenses of the West African Expedition, nearly the whole of which was raised by voluntary contributions. The expenses included 154*l.* for books and printing, 32*l.* for lectures, and 74*l.* for all other expenses. The library of the society has been united for several years past with the libraries of the Natural History Society, the Senkenberg Medical Institute, the Medical and the Physical Societies, and the entire collection is open to members of any of these societies. Three so-called "scientific meetings" for the reading of papers and their discussion were held during the year, in addition to which seventeen lectures were delivered by Karl Mauch, Dr. Emil Bessels, Dr. Karl Oppel, E. Mohr, and others. The Society has likewise been instrumental in erecting a house on the highest summit of the Taunus Mountains, and supports the efforts of the "Taunus Club," whose task, with respect to the Taunus, is the same as that of the more ambitious Alpine Clubs with reference to the Alps. Herr H. Glogau is President for the current year, Herr K. Pieg, honorary secretary. The annual report, in addition to an ample business statement, contains a *précis* of the meetings, a paper on Southern Russia by B. Pfeiff, and a series of interesting letters from Dr. J. Rein, who is now travelling in Japan. The society has published in addition, two parts of Frankfurt Statistics. Its activity cannot of course compare with that of the societies established in other great European capitals, but is, nevertheless, highly to be commended, as it contributes to the spread of geographical and statistical tastes. In our own provincial towns, but more especially in our colonies, there is scope for a large number of similar societies which would find a useful sphere of activity in the geographical exploration and description of their own immediate neighbourhoods in the preparation and publication of local statistics, the promotion of

geographical instruction in schools, the arrangement of lectures, &c. Very much, in fact, remains to be done at home. Throughout the British Islands an intelligent observer may find much deserving of record, and the production of a series of comprehensive statistical and topographical accounts of our counties would be task worthy of local geographical and statistical societies, whose formation we advocate. Our explorers and tourists now go abroad in search of adventures. We advise them to bestow some of their energies upon their native country, and ask them in the words of Schiller—

Warum in die Ferne schweifen,
Wenn das Schöne liegt so nah?

HAMBURG GEOGRAPHICAL SOCIETY.—*May 13th, 1875.*—Dr. Kirchenpauer, President, in the chair. Mr. Friederichsen announced that £390 had been subscribed by members of the Society in aid of an expedition to Persia about to be undertaken by Dr. Andreas. The region to be explored by this traveller was bounded on the north by the road connecting Bushir, Shiráz, and Kirmán, and his knowledge of Persian archæology and history qualified him particularly for the work he had undertaken, and promised a rich harvest of scientific results. Dr. G. Neumayer, the director of the German Nautical Observatory (Seewarte), then rendered an account of the scope and objects of this newly created institution. The Seewarte will extend its labours to every subject connected with navigation, ocean geography, and meteorology. It will work out the observations made on board German vessels, prepare sailing directions, afford means for testing and improving nautical instruments, and establish meteorological and signal stations at the principal German ports. Its work will be carried on in accordance with the resolutions of the meteorological conferences held at Leipzig, Vienna, and London. Mr. H. Tetens read a paper on a journey through the state of Magdalena (Columbia) in 1874. Starting from Porto Dibull, a small harbour to the east of Santa Marta, the capital of the state, he travelled about 13 leagues in a southerly direction as far as Macatama, the most important settlement of the Aruanco Indians, at an elevation of 10,000 feet above the sea, and only about 3000 below the crest of the snow-capped Sierra de Santa Marta. He subsequently traced the Rio Tapia for a considerable distance from its mouth. The Goajiros, in Eastern Magdalena, have maintained their independence; they breed cattle and small horses, which they take for sale to Rio de la Hocha. They are tall, have smooth hair, and a chestnut complexion. The Aruancos on the other hand, scarcely exceed 4 ft. 6 inches in height, have a tawny skin, and can scarcely be distinguished from Creoles. They till the soil, and, like all other coast tribes, the Guajiros excepted, they talk Spanish. It is much to be regretted that Herr Tetens was not in a position to make a survey of the country explored by him, for the interior of the state of Magdalena is one of the least known portions of South America. Colonel Codazzi, whose posthumous *Atlas de los estados unidos de Columbia*, is well known to all geographers, unfortunately died before he had extended his valuable surveys to the northern portion of this state.

BORDEAUX SOCIETY OF COMMERCIAL GEOGRAPHY.—This Society, after seven months of existence, numbered on the 11th of June no less than 266 members. At a meeting on the 8th of February, under the presidency of M. Marc-Mamel, a paper was read on the mineral resources of the department of Ariège, a mountainous country with a scanty population, and but few lines of communication. Its mineral resources are, however, considerable, and deserve to be better known; iron, lead, zinc, antimony, copper, manganese, and cobalt, being all found, besides marble, lignite slate, and numerous other stones.

At a subsequent meeting on the 22nd of February, a paper was read by M. Malvezin, on the six different projects for opening communication across Central America between the Atlantic and the Pacific.

EGYPTIAN GEOGRAPHICAL SOCIETY.—This Society owes its origin to the enlightened policy of the Khedive, who charged Dr. G. Schweinfurth with its organization, and appointed him President. The first meeting took place on the 3rd of June, when Dr. Schweinfurth delivered an inaugural address. He was able to announce that communications had already been established with the leading geographical societies of the world, and that the first number of a monthly journal would be published in October or November next.

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ERRATA.

In the article on "Paraguay," in our last number,
Page 201, 2nd col., line 18, for their, read our.
" 202, 1st " " 40, for as, read by.
" " 2nd " " 29, for grancampes, read grass camps.
" " " " 63, for was, read has.
" 203, 1st " " 60, for molance, read molasses.

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THE
GEOGRAPHICAL MAGAZINE.

SEPTEMBER, 1875.

NOTES ON RECENT EXPLORATIONS IN
CENTRAL ASIA.

THE publication of a third edition of Colonel Walker's map of Turkistan* affords an opportunity of calling attention to the great strides that have been made in our knowledge of the geography of Central Asia in the two years that have elapsed since the appearance of the second edition. I propose, in the present paper, to notice briefly the additions and rectifications which have been made through the agency of British officers and others, working from the side of India. The greater portion of these have been derived from the labours of the mission to Kashgharia, under Sir Douglas Forsyth, of which I was the geographer; but some very important additions have also been made in the regions of the Upper Oxus, which were being explored at the same time by emissaries of the Indian Trigonometrical Survey. A subsequent exploration was made, by one of the well-known *pandits*, of an entirely new route across Great Tibet, of which a considerable portion, which falls within the limits of the the Turkistan map, is now published.

As full details of the geographical work executed in connection with Sir D. Forsyth's mission will be found in the report thereof, which is now being passed through the press, I only propose to give a summary of the principal results. These are:—

1st. The correct fixing of certain important towns and positions by astronomical observations, and the verification of previous determinations which had been made at some of the same points.

2nd. The survey of about three thousand miles of route lines, a great portion of which is entirely new, while the portions which are not new have been re-surveyed with greater accuracy than was originally possible.

I. As regards the astronomical results I need not here enter at length. At Kashghar I was enabled to obtain very complete sets of observations to the moon for longitude, and the resulting position, viz., long. $76^{\circ} 6' 47''$ E. of Greenwich, has been used as the origin for all the mapping of Eastern Turkistan. Colonel Scharnhorst, who accompanied the Russian

Mission to Kashghar, under General Baron von Kaulbars, in 1872, determined the longitude to be $76^{\circ} 4' 42''$. The difference of about two miles has to be reduced by two-fifths of a mile to allow for the distance between the respective stations of observation, which lie in almost exactly the same parallel of latitude—for which Scharnhorst's value was $39^{\circ} 24' 16''$ N.—while my own determination was $39^{\circ} 24' 26''$. It is most satisfactory to find that the determinations by Russian and British officers are thus almost identical.

An equally satisfactory connection was made to the west with the easternmost point reached by Lieut. Wood in his adventurous journey up the Oxus in 1838—viz., the western extremity of the Victoria Lake in the Great Pámir. My own chronometric observations depending on my astronomical value of Kashghar, give for this point within one minute the same longitude as determined by Lieut. Wood in the survey which he brought up from Kabul—my value being $73^{\circ} 40' 38''$ E. long., and that of Lieut. Wood* $73^{\circ} 40' 38''$. Our latitudes are identical, viz., $37^{\circ} 27' N$.

The longitude of Kila Panjah (in Wakhan), the most westerly point visited by the European members of the mission, was determined by three independent methods, viz., by lunar observations, by chronometric measurements from Kashghar, and by connection with the latter place by a route survey. The value finally accepted is $72^{\circ} 45' 29''$ E. of Greenwich. Its latitude is $37^{\circ} 0' 18'' N$.

The position assigned to the Yangi-Shahr, or new city of Yarkand, is $38^{\circ} 25' N$. lat. and $77^{\circ} 15' 55''$ E. long., values which agree very nearly with those obtained by Mr. Shaw.

II. As regards the route surveys, a great amount of labour was involved in the re-survey of the various roads between Ladakh and Turkistan, *viâ* the Karakorum Pass, and by Changchenmo, and considerable rectifications were found necessary in the country to the north of the Karakorum range, which do not, however, require to be noticed in this place. Amongst the more important routes which it is desirable to make some special mention of we have—

- (a.) The road from Yarkand to Aktágh *viâ* Kugiar.
- (b.) " " " Yarkand to Khotan.
- (c.) " " " Khotan to Sorgáhk and Noh.
- (d.) " " " Chehil Gombáz to Yarkand.
- (e.) " " " Yarkand to Kashghar.

* Map of Turkistan and the countries between the British and the Russian Dominions in Asia—mapped on the basis of the surveys made by British and Russian officers up to 1875—compiled, drawn, and photozincographed in the office of Colonel J. T. Walker, R.E., F.R.S., Superintendent of the Great Trigonometrical Survey of India, June 1875. In four sheets; scale 1 inch = 32 miles.

* See page 232, New Edition of Wood's *Oxus*, with Essay by Colonel Yule.

- (f.) The road from Kashghar to Chadyr-kul.
 (g.) " " Kashghar to the Belowti Pass.
 (h.) " " Kashghar to Marálbáshi.
 (k.) " " Kashghar to the Pámirs and Kila Panjah.
 (l.) " " Tshkashem to Kila Wámeer.

(a.) *The road from Yárkand to Aktágh viâ Kugiar.*—A portion of this road, viz., from Aktágh down the Yarkand River to opposite the Yangi-diwan Pass, was explored in former years by Mr. Hayward, but between the Pass and Karghalik we had no correct data on which to construct our maps. A careful route survey has now been made of the whole road, which, although abandoned as a trade route in recent years for fear of robbers, was formerly a portion of the regular winter caravan route between Yarkand and Leh.

(b.) *The road from Yarkand viâ Karghálík and Gúma to Khotan* has now been carefully surveyed by one of the Pandits. Our former knowledge of it depended on a hasty reconnaissance of the eastern portion of it by Mr. Johnson on his return journey from Khotan in 1864. The result of the recent survey operations, with reference to the position of Khotan, has been to necessitate an alteration in its longitude of more than half a degree. Its newly-determined position is 80° E. of Greenwich, agreeing much more nearly with that assigned to it in the old Chinese tables (80° 21' E.) than the position it has recently held in our own maps. The new value agrees well with the position assigned to it by Hayward,* based on its reported distances from Sánju and from Yarkand.

(c.) *Khotan to Sorghák and Noh.*—This road was surveyed by one of the Pandits attached to the mission. It passes between 1½° to 2° to the east of the most easterly route between Turkistan and Ladakh hitherto surveyed, i.e., the one by which Mr. Johnson went to Khotan. The road from Noh lies in a north-easterly direction over an elevated plain, varying from 15,000 to 17,000 feet above sea level, crossed here and there by low ridges rising somewhat irregularly from the surface of the plain. In lat. 35° 7' the road crosses, at a height of but little more than 17,000 feet, the watershed of a snowy range, which is probably the true eastern continuation of the Kuen Luen Mountains; it then descends the Kiria River, in a northerly direction, towards the plains of Turkistan, as far as Arash (16,000 feet), where it again ascends on to a large plain called Ghubolik (17,000 feet), which connects the snowy range just alluded to with another range to the north, which although also covered with snow in July, was not so high as the southern range. This northern ridge forms the northern buttress of the vast Tibetan plateau, and from it flows the Polu stream (a branch of the Kiria River), in descending which to Polu—a distance of about 28 miles, including windings—there is a fall of about 9000 feet. From Khotan, Polu may be reached, either by the direct road (by Chihar Imám) which skirts the feet of spurs from the elevated plateau above, or by Kiria, the route followed by the Pandit, and by which the distance from Khotan is 155 miles. Throughout the whole road from Kiria to Leh fuel was abundant everywhere, and there was only one stage where there was not a good

supply of grass. These facts would indicate the line as one well adapted to the native merchant, to whom time is of no great value. As far as can be learned, however, from enquiry, it never has been used as a trade route, at all events on a large scale, owing principally to fear of the Chang-pas or Tagh-lik wandering tribes of Tartars, who sometimes frequent the neighbourhood. These men are nominally subject to the Chinese officials at Garlokh and Rudokh, but practically are only so far subject to them that they would probably abstain from committing violent aggression on parties travelling under the protection of those authorities. Near Rikong Chumik were the remains of several huts; others were frequently seen along the line of road, although, fortunately for the Pandit, he did not meet or see a single human being between Ghubolik and Noh, a distance of 244 miles, a circumstance which enabled him to complete his route survey up to Noh without interruption. Further details about this route are given in the published reports of the mission.

(d.) *Chehil Gombás to Yarkand, viâ the Charling River.* This road was surveyed by a Pandit, and is chiefly important as fixing the position of Khusharáb on the Sarikol branch of the Yarkand River. It also diminishes the large unexplored area lying to the north of the Muztágh or Karakorum Range, and to the west of the newly-surveyed Kugiar route.

(e.) *Yarkand to Kashghar.* This road had previously been carefully surveyed by Hayward, and the most important addition I am enabled to make is the correct determination of the height of Tagharma Peak, and others of the same range lying to the west of and nearly parallel to our road. Tagharma, the highest of these, I ascertained (by altitudes carefully measured with a theodolite at Yapchan and at Kashgar) to be no less than 25,500 feet above sea level, a somewhat unexpected result, as Hayward had estimated its height at but little more than 21,000 feet. My results, however, confirm those of Fedchenko, who, looking from near the Alai, in the direction of these same mountains, estimated the height of some peaks that he saw at 25,000 feet.

(f.) *Kashghar to Chadyrkul.* An account of this road has already appeared in the Geographical Society's *Proceedings* in the shape of a letter written by me to Sir Bartle Frere. I will therefore here merely allude to the circumstance that my survey of this road is the only existing link between the Russian and English Surveys; and it is a curious fact, that when plotting out my work since returning to India—by making use of the Russian astronomically determined latitude of the east end of the lake, to which I had taken a bearing from a point nearly due south—I place the end of the lake in precisely the same longitude as finally determined by the Russians—the small discrepancy existing at Kashghar disappearing altogether on reaching Chadyrkul. It must be stated that both my own and the Russian surveys of this section were very rough, and made under great difficulties.

(g.) *The road from Kashghar to the Belowti Pass, on the road to Ush Turfán and Aksú.* I succeeded in making a rough but tolerably accurate survey of this route, based on astronomical observations, and a somewhat detailed description of it is given in the Yarkand reports. The previously existing delineation

* Vide R.G.S. Journal for 1870, page 21.

tions of this road are extremely incorrect, and are derived solely from Klaproth's map of Central Asia, based on the work of the Peking missionaries. My previous visit to Chadyrkul, and a subsequent exploration in the Artysh districts to the north of Kashghar, have made it apparent that that portion of the Thian Shán Mountains lying to the north and north-east of Kashghar, marked on our maps as "the Syrt," and hitherto represented as a high table-land rising immediately above the plains of Turkistan, in reality consists of a series of parallel mountain ranges, running as a rule from west to east,* each range increasing gradually in height from the lowest ridge on the south to the main range on the north—each range also decreasing in height as it runs eastward. Between these ranges, and running parallel to them on extensive level plains, at first very little higher than the plateau of Eastern Turkistan, but also successively rising higher and higher towards the north, while at the same time they slope down towards the east. Thus, the Tughamati Plain, about 45 miles north of Kashghar, is higher by 2000 feet; while the Jai Tupa Plain, about the same distance east of the Tughamati Plain (of which in all probability it is the continuation), is only about 1000 feet higher than Kashghar. These large plains have generally much grass and fuel though but little water. At one of our camps, which was under snow, the Kirghiz who were encamped there, told me that it was only in mid-winter that they could keep their flocks at that particular place—as the snow then lying on the ground served as a substitute for water, which was not obtainable at any other season of the year.

Another important result of this excursion is the alteration that has been necessitated in the positions of Ush Turfán and Áksú—the former of which has been shifted nearly three-quarters of a degree to the east of the place assigned to it in Colonel Walker's map of 1873. This involves a similar alteration as regards Áksú, and it is found that the new position agrees very well with the latest determination of the Russians.

(h.) *The road from Kashghar to Marálbáshi on the Áksú road.* The position in longitude of Faizabad, some 30 miles to the east of Kashghar, was determined chronometrically by myself, and the road between that town and Chárwágh, a few miles to the east of Marálbáshi, depends on a reconnaissance made by Captain Biddulph, checked by observations for latitude taken by that officer at Marálbáshi, a place of considerable importance, situated at the junction of the roads from Yarkand and Kashghar to Áksú and the frontier towns of the Amír of Kashghar's dominions. A native agent was subsequently despatched from Kashghar to Áksú, by Sir Douglas Forsyth, and the notes on the road that he brought back have been utilized in making considerable alterations in the course of the Kashghar River between Marálbáshi and Áksú.

(k.) *The road from Kashghar to Panjah (in Wakhán).* Our party went to Wakhán by almost the identical route followed in an opposite direction by the "Mirza," in 1869—*i. e.* through Tashkurhán and the Little Pámír. On our return journey we went by the Great Pámír road, which Wood followed in 1838,

* Thus resembling in physical construction other portions of the Thian Shan with which the Russian surveyors have made us familiar.

as far as the west end of Lake Victoria; from that point to Ak-tásh, in the Áksú Valley, we followed a road which has never before been surveyed or described, although Colonel Yule has published an itinerary by Faiz Bux, of a road which lies intermediate between the roads by which we went and returned. Numerous observations for latitude and time have enabled me to lay down the roads through both Pámírs with great precision, and to connect most satisfactorily the routes of Eastern and Western Turkistan. Careful hypsometric observations for determination of height above sea-level were made throughout the journey (as indeed was the case over the whole 3000 miles of route survey before alluded to). My observations give a smaller height for the Victoria Lake, *viz.*, 13,900 feet, than that determined by Wood; while the height I obtain for the lake of Little Pámír, 13,100 feet, is almost identical with that deduced from the Mirza's observations in 1869. Although the Mirza's survey of that portion of the road from Panjah up to the Little Pámír was very good, yet the section between the Pámír and Kashghar has been found to stand in need of considerable revision—a fact by no means to be wondered at, considering the extreme difficulties under which he laboured. One curious mistake was detected, and it is interesting to observe that the discovery had been anticipated by Colonel Yule—*vide* the last page of his introductory essay to Wood's *Oxus*. The stream flowing from the Little Pámír Lake—passing by Ak-tásh—where it bears the name of Áksú was ascertained by us to contain the head-waters of the Murghábi River, which, joined by streams from other lakes to the north, is now known to flow into the Panjah River at Kila Wámur. The Mirza had erroneously imagined that the Áksú stream wound its way through the range that lies to the east of Ak-tásh (and considering that the whole country was under ice and snow, and he himself probably half dead from fatigue and cold, he may well be excused the blunder), ultimately finding its way into the Yarkand River. In the map constructed from his work—which has for some years been our only authority for the geography of that portion of Asia—the vicinity of the Little Pámír Lake (which has been erroneously supposed to have a double outlet) was shown as the watershed, between Eastern and Western Turkistan, whereas the true watershed, where crossed by us, was at the Neza-tásh Pass (height 14,920 feet), over the range to the east of Ak-tásh, and about 50 miles to the east of its former erroneous determination.

Amongst other points solved during the excursion to Wakhán is the hitherto doubtful question as to the supposed double exit from the Pámír Lakes. It has now been positively ascertained (although not without considerable difficulty, as will be seen from the detailed reports), that neither of the lakes of Great or Little Pámír have more than one outlet. In the case of the former the water flows west, and in the latter east.

With one exception, circumstances did not permit of any explorations being made off the line of road. This opportunity was given to Captain Biddulph—who, instead of accompanying the main party *via* the Great Pámír, returned to Ak-tásh *via* the road we had gone; and during a day's halt at Sarhadd, the highest inhabited place of the Wakhán Valley, he made a

successful reconnaissance to the Baroghil Pass leading over into the valley of Chitrál.

A good deal of information about the country to the north of our route was obtained from native sources, but unfortunately the Kirghiz who inhabited the Great Pámír at the time of Lieutenant Wood's visit, have long since abandoned the country for more settled tracts to the south of Yarkand. This steppe is now uninhabited, and our Wákhi guides knew but little of the country beyond. What information we were enabled to collect from them, and from some Kirghiz who accompanied us from Kashghar, has been embodied in the map which I prepared to accompany Sir D. Forsyth's reports, in which I have endeavoured to reconcile as far as possible the scanty and often conflicting evidence which we succeeded in obtaining. A study of this map will probably tend to demolish any lingering trust in the celebrated fictitious travels of the anonymous German Baron, that may yet remain in the minds of Russian geographers.

The long contested question as to whether the famous Karakul (or Dragon Lake of the Chinese) drained into the Yarkand or the Oxus Basin has, it is believed, been satisfactorily solved by the identification, as originally surmised by Mr. Shaw, of two lakes bearing the same name. The smaller of these lies nearly due north of Tash Kurhán, and not very far from Hayward's Tagharma Peak. From this little Karakul Lake a river issues, which, flowing through the deep and precipitous Gez defile, emerges in the plains west of Tashbalig and Opál, where, under the name of Yáman-yar, it is said to divide into two principal branches, one of which retains the name Yáwan-yar, while the other is known as the Kusán. These again are subdivided into the numerous branches and canals which cross the road between Yangi Hissar and Kashghar, and have caused so much confusion to geographical students. The larger Lake Karakul is the one that was passed by Abdul Medjid in his journey from India to Khokand, and the balance of much contradictory testimony goes to prove that its waters help to form the Murghábi branch of the Oxus.

(1.) *The road from Ishkashim through Gharán and Shighnan to Kila Wámar* is the last piece of work to be noticed in connection with Sir D. Forsyth's mission. My assistant Múnshi Abdul Luthan was detached from our party at Panjah, to make an excursion down the Oxus, which he succeeded in following for 100 miles along that unknown portion of its course which extends from Ishkashim, where the river takes a sudden bend to the north, to Yang-Kila on the frontiers of Koláb, where it has been seen and described by Lieutenant Wood. The most important positions now fixed are Kila Bar-Panjah on the left bank of the river, the chief town of Shighnán; and Kila Wámar, the principal town in Roshan, a dependency of Shighnán. Kila Wámar is on the right bank of the Panjah, just below its junction with the Murghábi or Bártang River—the river which has already been described as issuing from the lake of Little Pámír, and which subsequently is said to receive the drainage from the lakes of Rang-Kul and Great Karakul. It was crossed by the Múnshi at a distance of about 1000 paces above its junction with the Panjah, and the width of the river bed is described as $1\frac{1}{2}$ mile, of

which at least 1 mile was occupied by water (in May): the stream was in three channels, and the torrent so rapid that many of the horses lost their footing while fording it. In summer it can only be crossed in boats. Its water is red, thick, and muddy, while that of the Panjah is very clear. The volume of water in the Murghábi is considerably larger, and the velocity greater than that of the Panjah. It would appear, therefore, that the latter stream, which has hitherto been considered the main stream of the Oxus, should give the palm to the Murghábi River, which is probably the longest and largest of all the affluents of the Oxus.

Another affluent of the Panjah was observed on its right bank, viz. the Suchán River, which is formed by two large streams, the Shákh-darah and the Ghúnd, which unite about half a mile before falling into the Panjah. Shighnán, including Roshán, is tributary to Badakhshan, and appears to be a country of considerable importance, probably able on an emergency to muster 6000 or 7000 armed men.

I have now to notice the work of the explorer who was employed by the Great Trigonometrical Survey in the regions beyond the Oxus during the same period. This was the well-known "Havildar," who had been employed in conducting an exploration through Dir and Chitrál to Badakhshán in 1870. On the present occasion he went *viâ* Peshawar and Kabul to Badakhshán; but instead of travelling by the well-known Bámián route, he took a new and much more direct line, the greater portion of which had never been previously surveyed. Going north to Chárikár, he crossed the Hindu Kush Range by the Sar-aulang (or Sarolong) Pass, and descending to Khinján, passed along a very direct road by Narin and Ishkamish to Faizabad in Badakhshán. Thence he started on a tour which, with the previously described exploration down the Oxus to Kila Wámar, has entirely altered the appearance on our maps of that hitherto almost unknown portion of Central Asia. Proceeding westward to Rusták he turned north, crossed the Oxus at Samti, where he found the river still called the Panjah. He then visited in succession the towns of Koláb, Khawáling (or Khuwálin), Sagri-dasht, Kila Khumb (the capital of Darwáz), and Kila Wanj, places of which geographers have long known the names, but have been most doubtful of their absolute or even relative positions. At Kila Khumb the Havildar again struck the Panjah, and his road continued for some 50 miles along the right bank of the river, in the very centre portion of the great bend before alluded to, which has so long been unknown. At Yaz-ghulam, the frontier village of Darwáz, he was most unfortunately turned back by orders from the ruler of the country. The point he reached is probably not more than one long day's journey from Pigish, the extreme point reached by the Múnshi from the opposite direction, only a few weeks previously, as it subsequently turned out, to the arrival of the Havildar at Yaz-ghulam. The Havildar, ignorant of what had been done by the Múnshi, being most anxious to complete his own work, eventually went round *viâ* Faizabad to Ishkashim, and tried to make a survey down the river to Yaz-ghulam; but he was again stopped, this time at the southern

frontier of Shighnan, the ruler of which country would not permit him to enter it. Thus there is a gap between the explorations of the Havildar and the Munshi, the existence of which is much to be regretted, but it was clearly unavoidable, and happily the missing link is only a short one.

From Yaz-ghulám the Havildar returned to Koláb by his original route. From Koláb he went to Khulm, by the direct road, which lies for the most part to the north of the Oxus. This has turned out to be a most important piece of exploration, as it has not only determined the positions of the towns of Kurghán Tissa and Kubádián, but has been the means of proving that the Surkháb River does not join the Oxus near Koláb, as has long been supposed, but more probably at a point about 80 miles lower down.

The ideas which modern geographers have hitherto entertained regarding the lower course of the Surkháb appear to have been inherited from Macartney, who, in the geographical memoir accompanying the report on Elphinstone's mission to Kábul in 1803, states that "the Surkháb or Karátigin River rises in the Pámír ridge, and after a course of 180 miles empties itself into the Oxus, 30 miles above the Kokcha, on its right bank."

In conformity with these views, the Surkháb has been usually shown hitherto as passing close to Koláb, and joining the Oxus at some distance below that town. The Havildar came across a small river at Koláb, which he was informed joined the Oxus at a short distance to the south; this river, however, was not the Surkháb, but a river rising in the hills some 60 miles to the north of Koláb, and known in its upper course as the Áksú, and lower down as the Koláb River. The Havildar did not strike the Surkháb until he reached a point in lat. $37^{\circ} 35'$ by long. $68^{\circ} 32'$, more than 70 miles to the west of Koláb. It did not occur to him to follow either of these two rivers down to its junction with the Oxus; but there can be little doubt that the points of junction have been given us by Lieut. Wood, in whose map a small stream is made to join the Oxus, a few miles to the north of the confluence of the Kokcha, and another stream is made to join the Oxus a few miles to the west of Hazrat Imám. No name is given to either stream in Wood's map, but Mr. John Walker in his well-known map of Afghanistan (1844 corrected to 1857), names the eastern one the Surkháb, and the western one the Wagish. Where he got these names from is unknown to me; most probably that of the eastern stream from Macartney, and that of the western one from Wood. Now the Havildar reports that the Surkháb River is more generally known as the Wáksh than the Surkháb, in its lower course; his map shows that where he crossed the Wáksh it was trending southwards, in the direction of the junction of Mr. John Walker's Wagish with the Oxus; and this circumstance, with the similarity of the names, appears conclusively to prove the identity of the rivers Wáksh and Wagish, and to indicate positively the point of junction of the Surkháb with the Oxus.

Geographers have always felt a difficulty, regarding the originally adopted point of junction, that Wood should have known nothing about it, though he was believed to have been so close to it; and Colonel Yule, in his preliminary essay to *Cathay*, actually

abandoned that point in favour of what is now shown to be the correct junction; but he did so with considerable misgivings, and mainly on the grounds that his hypothesis had "at least the advantage of not flying in the face of an honest and able traveller." Subsequently, however, he became a convert to the original view of the matter, and in his preliminary essay to the second edition of Wood's *Oxus*, he says, "It has been the fashion in modern maps to represent the junction of the Surkháb with the Panjah, as occurring a few miles to the north of the confluence of the Kokcha . . . ; there can be little doubt that the real confluence is where Macartney's map placed it, viz., at least 30 miles above the Kokcha junction, considerably to the north of Saiad, and beyond the utmost reach of Wood's ride, in the vicinity of a place called Kinghán Tapah." The Surkháb actually does fall into the Oxus near Kinghán Tapah (or Tipa), and that place turns out to be 50 miles to the west of the position given to it in Colonel Yule's last map.

In the new edition of Colonel Walker's map the junction of the river of Karátigin, or Kizil-su or Surkháb, or Wáksh, with the Panjah, is made to take the place of Mr. Walker's Wagish—and the Áksú or river of Koláb is made to follow the course of Wood's nameless tributary near Saiad.

From Khulm the Havildar went to Ishkashim, as before narrated, and failing in his endeavours to get through Shighnan, returned to India *viá* Kábul and the Bamian route.

The survey of the Havildar has given us fairly approximate positions for the points visited by him, and has enabled me, at Colonel Walker's request, to utilize and combine the details furnished in the well-known accounts of the routes of Abdul Medjid and Sultan Muhammad—as well as the information contained in General Abramof's account of Karátigin and in M. Fedchenko's more recently published maps and memoirs. The delineation of Karátigin is entirely derived from these sources, taken in combination with the altered position that has been given to the lower portion of the course of the Wáksh or river of Karátigin. Although there are numerous inconsistencies in all these data—even in some instances between the letter-press and map of M. Fedchenko—I trust that the delineation which I have adopted, after numerous discussions with Colonel Walker, will be found to be fairly reliable.

Considerable alterations will also be found in the map of the country lying to the north and north-west of Khulm. I have endeavoured to utilize all existing information about those parts, from Russian maps as well as from various itineraries to which I have had access, but the few accounts we have of the routes between Shahr-i-Sabz, Hissar, and Karátigin are so meagre and inconsistent that it is impossible to combine them in a thoroughly satisfactory manner.

Another exploration, the results of which find a place in Colonel Walker's map, was made by a "Mullah," an assistant of the Havildar, by whom he was left at Jalálábad with instructions to make his way up the Kunar River—from its junction with the Kabul River to its head in the Baroghil Pass—whence he was to find his way back to India *viá* Yarkand and Ladakh. The Mullah ascended the river as far as

Asmár, whose chief he found engaged in hostilities with the Káfir tribes that inhabit the country on the banks of the river above Asmár; so he had to leave the river and make his way across country to Dir; thence he went to Chitrál by the same route followed by the Havildar on a former occasion; rejoining the river near Darosh. From Chitrál he travelled over new ground, following the river up to its source, and fixing the positions of the town of Mastúj and of various other places on his line of route. He crossed the Baroghil Pass at the head of the Chitrál Valley and then descended to Sarhadd Wakhan, where he joined on to my own line of route-survey between Kashgar and Panjah. His survey has shown that some alterations are necessary in the positions of Dir and Chitrál as previously determined from the Havildar's work.

A very important exploration has been made in Great Tibet by Major Montgomerie's original Pandit, the account of whose journey to Lhasa in 1866 is well known to geographers. He started from Leh after the return of Sir Douglas Forsyth's Mission (to which he had been attached), and proceeding by a very direct road, much to the north of any that has hitherto been traversed by our Pandits, he reached the Namcho or Tengri-nur Lake, the successful exploration of which by another Pandit has very recently been described.* From Namcho Lake he proceeded to Lhasa, and thence made his way to India by a more easterly route than any we were previously acquainted with. When at about 40 miles east of Lhasa, he followed the Brahmaputra River for a short distance, and was enabled to fix approximately its course for a hundred miles still further to the east.† He traversed the Tibetan district of Tawang, and emerged in British territory at Údalgíri in the Durrung district of Assam, having made a very careful route-survey over almost entirely new ground for a distance of 917 miles between Noh and Lhasa, and 306 miles from Lhasa to Udalgíri. Excellent astronomical observations (for latitude) were made throughout his journey, and the quality of his work has been proved to be first rate. The difference in longitude between Lhasa and Udalgíri being little more than a degree, and the position of Udalgíri being well known, the value of the longitude of Lhasa, as determined from the Pandit's route-survey between these two places, viz., $91^{\circ} 5' 30''$, ought to supersede all former determinations.

Detailed reports of the explorations of the Havildar, the Mullah, and the Pandit are now being prepared, and ought to prove extremely interesting. They will probably be published with the Great Trigonometrical Survey Annual Report for 1874-75.

HENRY TROTTER,
Captain R. F.

MUPOORIE, INDIA,
28th June, 1875.

* Vide Great Trigonometrical Survey Report for 1873-74; also *Geographical Magazine* for February, 1875.

† By taking bearings to peaks beyond which the river was said to flow.

THE AMU DARYA EXPEDITION.

THE Russian expedition against Khiva in 1873 appeared to afford an excellent opportunity for exploring the ancient bed of the Amu Darya. M. A. Y. Glukhovski and M. M. N. Bogdanof consequently proposed to the Russian Geographical Society to fit out a scientific expedition for that purpose. The exploration of the old bed of the Amu Darya had already been mooted in 1864, but at that time the Russians had no settlement on the eastern shore of the Caspian which might serve as a base of operations, and political conjunctions were far from favourable. In 1870, after the occupation of Krasnovodsk, Messrs. Radde and Sievers were able to start a private expedition, but their labours, as well as those of Stebnitzki, in 1871-1872, did not extend beyond the wells of Igdy. The commission of the Society desired that the expedition should extend its operations over the whole region lying between the Syr Darya and the supposed former mouth of the Oxus into the Caspian; but General Kaufmann, the Governor-General of Turkistan, was not in a position to approve of so extensive a scheme, and merely sanctioned the exploration of the districts held by Russia. The expedition, as finally started, included four sections, viz., surveys, meteorology, ethnography, and natural history. Colonel Stolyetof was entrusted with the command of the expedition; Professor N. P. Barbot de Marly joined it as geologist, and Major Herbert Wood R.E., as volunteer. The meteorological observations were made by Messrs. Dorandt and Hilberg. The following is a *résumé* of the work performed by the expedition:—

TOPOGRAPHICAL SURVEYS.

An area of about 3000 square versts was surveyed, including a large portion of the delta of the Amu Darya and that river as far as Meshekli on the frontiers of Bokhara, and the difference of level between the Syr and Amu, and between Nukus and Lake Aral was determined. The extent of the lines along which altitudes were determined amounted to nearly 1300 versts. Nukus is at an elevation of 60 feet above Lake Aral; the Amu Darya at Tuya-Boyun, near the frontier of Bokhara, is 206 feet above the lake, and the fork of the Syr and Yani Darya 296 feet. These determinations were made with great care, and they show that the delta slopes gently towards the east. Lake Dau-Kara occupies the most considerable depression of the whole district: this accounts for the eastern arm of the Amu Darya being better adapted for navigation than the western. The levels between the Syr and Amu showed very clearly that it would be possible to conduct the waters of the former into the dry river-bed Yani Darya. Dau-Kara is about 210 feet below Perovski, and the slope throughout is continuous. Some interesting data on the periodical disappearance of the Yani Darya was collected. In the last century that river, known also as the Yinkar Darya, branched off from the Syr 15 versts below Julek, and separated into two arms to the south-west of it. One of these arms reached the Dau-Kara; the other, known as the Kichkine Darya, flowed towards the north-west, and entered the Aral. The bed of the latter has been filled up in many places by sand-drifts. In former times the Yinkar Darya fed many canals, the traces of which are still to be dis-

covered in the Kizil Kum desert. The ruins discovered along this river proved satisfactorily that there existed here a settled population of a high degree of culture. At that time the Kara Uzyak, an island between Perovski and Karmakchi, was a lake, which received the superabundant waters of the Syr, through a narrow arm, which branched off from the modern river at Perovski. The communication between that lake and the Syr, at Fort No. 2 (Karmakchi), was brought about only about one hundred years ago, when the inhabitants dug a canal for the purpose of irrigating their fields. In the beginning of the present century the Kokanzis constructed a dam across the Yinkar Darya, at Bok-Tyulen, near Perovski, in order to prevent the Kirghiz subjects from visiting Khiva, and since that time the Syr overflowed the country surrounding the lake, and the banks of the Yinkar Darya were converted into a wilderness, resembling that existing between Sary Kamysh and Kuna Urganj. About twenty or thirty years after the construction of this dam, the Kokanzis had made friends with the Khivans, and they then re-directed the waters of the Syr into the dry river-bed. They did this at Ak-Mechet, which is above Bok-Tyulen, and thus gave rise to the Yani Darya, or "new river." But as a portion of the waters of the Syr had found their way into the Kara Uzyak by that time, the quantity of water which entered the Yani Darya was reduced to that extent, and proved sufficient merely to reach the lakes Akcha Kul and Kucha Tengiz, which are dried up at present, but not the Dau-Kara or Lake Aral. This explains the disappearance and reappearance of a large river, which Meiendorff witnessed during his two journeys to Bokhara. About twelve or fifteen years after the period referred to above, the inhabitants of the district of Perovski constructed dams across the Yani Darya, close to where it forks off from the Syr, and thus, for the second time, converted the country along its banks into a desert. The natives living along the Syr are unanimous in their opinion that the volume of the river has decreased visibly during the last thirty or forty years, and they account for this decrease by the canals of irrigation fed from it in the Khanat of Kokand. These facts are of some interest, for they illustrate the manner in which the physical features of a country may be changed through human agency.

The hydrographical features of the delta, including its lakes, as well as the Dau-Kara and Yani-su, were carefully examined. There can be no doubt that the natives are right when they assert that previously to the construction of a dam across the Laudan arm of the Amu, the delta had a very different appearance. At that time the centre of the present delta, which now consists of a swamp, covered partly with reeds, was occupied by numerous islands, rising more or less above the surface, and having a trough-like configuration. These islands had a settled population who cultivated rice. The abundant supply of water, and the small elevation of these islands facilitated the irrigation of the fields. The dam thrown across the Laudan naturally caused a greater volume of water to flow to the delta than formerly, and the islands were destroyed. At the same time the Kuvan-j-Yarma and Yani-su branches of the Amu, which were only inconsiderable streams formerly, increased much in size, and the dam which Admiral Butakof saw on the

latter has now been entirely washed away. The Ulkun Darya, or western arm, has become shallower, and the difficulties of its navigation induced the members of the expedition to search for a more suitable channel. This they found in the Yani-su.

The volume of water of the river was ascertained in various localities. At Tyuya-Boyun, above the delta, the volume varies between 120,000 and 160,000 cubic feet per second, that is to say, it is more than 50 per cent. more than that discharged by the Neva, and conveys some idea of the size of this great Asiatic river.

A steamer may easily ascend the Amu, though its current is strong and the navigable channel is subject to frequent changes. The depth of the water is sufficient throughout, there are no reefs, and vessels would be able, in most instances, to approach close to the banks of the river.

The whole of these surveys and examinations were carried on under the immediate supervision of Colonel Stolyetof, who was assisted by Messrs. Zubof, Bryukhof, and Shebashef of the Aral flotilla, and by Major Herbert Wood.

The meteorological observations were conducted most indefatigably, under the direction of Mr. F. B. Dorandt. Immediately on his arrival a physical observatory was constructed at Nukus, and a station at Petro-Alexandrovsck. Regular observations were begun on the 1st of July, and they will be continued during a year. Mr. Wilberg and non-commissioned officers take part in this branch of inquiry. The observations extend to temperature and pressure of air, moisture, direction and strength of wind, evaporation, precipitation, temperature of the soil, &c. Magnetical observations have been made at Kazalinsk, Nukus, and Petro-Alexandrovsck.

The climate of Khiva is said to be healthy and agreeable. During the whole of summer the temperature exceeds 30° C. only on two days. The autumn, up to the 1st of December, proved particularly pleasant.

The geological explorations were conducted by Professor Barbot de Marny, and extended over the whole of the newly-acquired territory. He first examined the Kashkana Tau in the Amu Delta, then the banks of that river up to the frontier of Bokhara, and subsequently the Sheikh Jeili Range and its ramifications on Lake Khojikul. Having done this he examined the Kizil Kum Desert, to the north of the Amu, and the various mountain ridges scattered over it, such as the Bukan Tau, Tamdyn Tau, Murun Tau, &c., reaching finally the Nuratanyn Kara and Ak Tau, and the city of Samarkand. These explorations showed that most of the sedimentary rocks are of cretaceous age. This result altogether upsets our present notions respecting the geology of the Amu Delta, for they prove that these territories, during the most recent tertiary epoch, were not covered by the sea, but consisted of dry land. White chalk was found, however, at one spot only, the prevailing rocks of cretaceous age consisting of sand and sandstones. These latter, not being bound together by vegetation, supply the steppe winds the material for the sand ridges, known by the name of Barkhan. The heaping up of these sandhills takes place before the eyes of the traveller, and no hypothesis at all is required to account for their existence.

An examination of the isolated hill ranges in the

steppes, which were hardly known by name only a short time ago, proved equally interesting. These consist of metamorphic rocks, principally crystalline slates and limestones, containing no fossils. Eruptive rocks (granite and others) occur only rarely and in small masses, and are found hardly anywhere except in the Sheikh Jeili and Bukan Tau.

No carboniferous rocks of any kind have been discovered, nor lignite or brown coal. The dykes of quartz which are frequent in the crystalline slates of Sheikh Jeili and Bukan Tau, hardly contain a trace of ores. But even if metals should be discovered in large quantities, it would hardly be possible to work them, as there exists no fuel. The only useful minerals discovered in the newly-acquired territory consist of building stones (particularly marble, which occurs in all the hills) and phosphorites. The latter were first discovered by Professor Barbot de Marny, and are used for the manufacture of mineral manure. Almandine and beryls have been found in the Sheikh Jeili Hills, but the specimens discovered hitherto are only of small value.

During the first period of the expedition, M. A. Severtzof, accompanied by S. M. Smirnof, journeyed along the shore of Lake Aral from Kazalinsk to Nukus. This journey showed that the eastern shore of the lake had undergone many changes, within recent years, owing to the sinking of the water. Bays, which in former times reached far into the land, now consist of dry land; sandbanks have been converted into islands, islands into peninsulas. The ancient shores can still be traced by means of their vegetation.

M. S. M. Smirnof explored the flora of the country, and directed his particular attention to the distribution of parasitic fungi. He is of opinion that the poor vegetation of the Aralo-Caspian region is due not only to the unfavourable climate, but likewise to the pernicious influence of these parasitic fungi, which stifle plants. M. Smirnof is already favourably known through his former labours on the vegetation of the Steppes, and his recent researches on the Amu will no doubt prove valuable additions to botanical science.

The ethnographical and statistical section of the expedition consisted of four members. Colonel L. N. Sobolyef directed his attention principally to the statistics of the population, commerce, and agriculture. He likewise bestowed some attention to the historical monuments still existing in the ruined town. Prince Riza-Kuli-Mirza, a Persian, who had joined the expedition merely in order to advance science, rendered himself exceedingly useful to all the members of the expedition through his knowledge of all oriental languages. M. Alexander made a list of all places and camps within the Amu Darya District, and collected information with respect to them. He likewise studied the language of the inhabitants of the Delta. The artist of the expedition, M. N. N. Karazin, filled his portfolio with interesting sketches.

This short sketch shows that the Amu Darya expedition has performed its task in a successful manner. This success is due, in a large measure, to the support of the local authorities, and particularly to that of the Governor-General of Turkistan, General von Kaufmann.

RECENT JOURNEYS IN PARAGUAY.*

THE country of Paraguay has a certain interest for Englishmen, for Sebastian Cabot, who discovered it more than three hundred years ago, was a native of Bristol. He ascended the Plata and the Paraguay, and, after some encounters with the Indians, returned to Spain in 1530. He was succeeded by many other adventurous spirits, one of whom, Cabeza de Vaca, made a most remarkable and difficult journey from the Brazilian coast to Asuncion, a total distance of 600 miles. To the Jesuit Fathers in Paraguay, as in the Chinese Empire, most of our early geographical knowledge is due: they were, however, subject to continual persecutions, and found firmest ground in the south of the country, till their final expulsion from all Spanish possessions in 1768.

Not long after this event, the disputed and uncertain limits of the possessions of Spain and Portugal in South America, were decided by the treaty of St. Idelfonse, and a Commission was appointed in 1780 to go out to define this boundary on the actual ground.

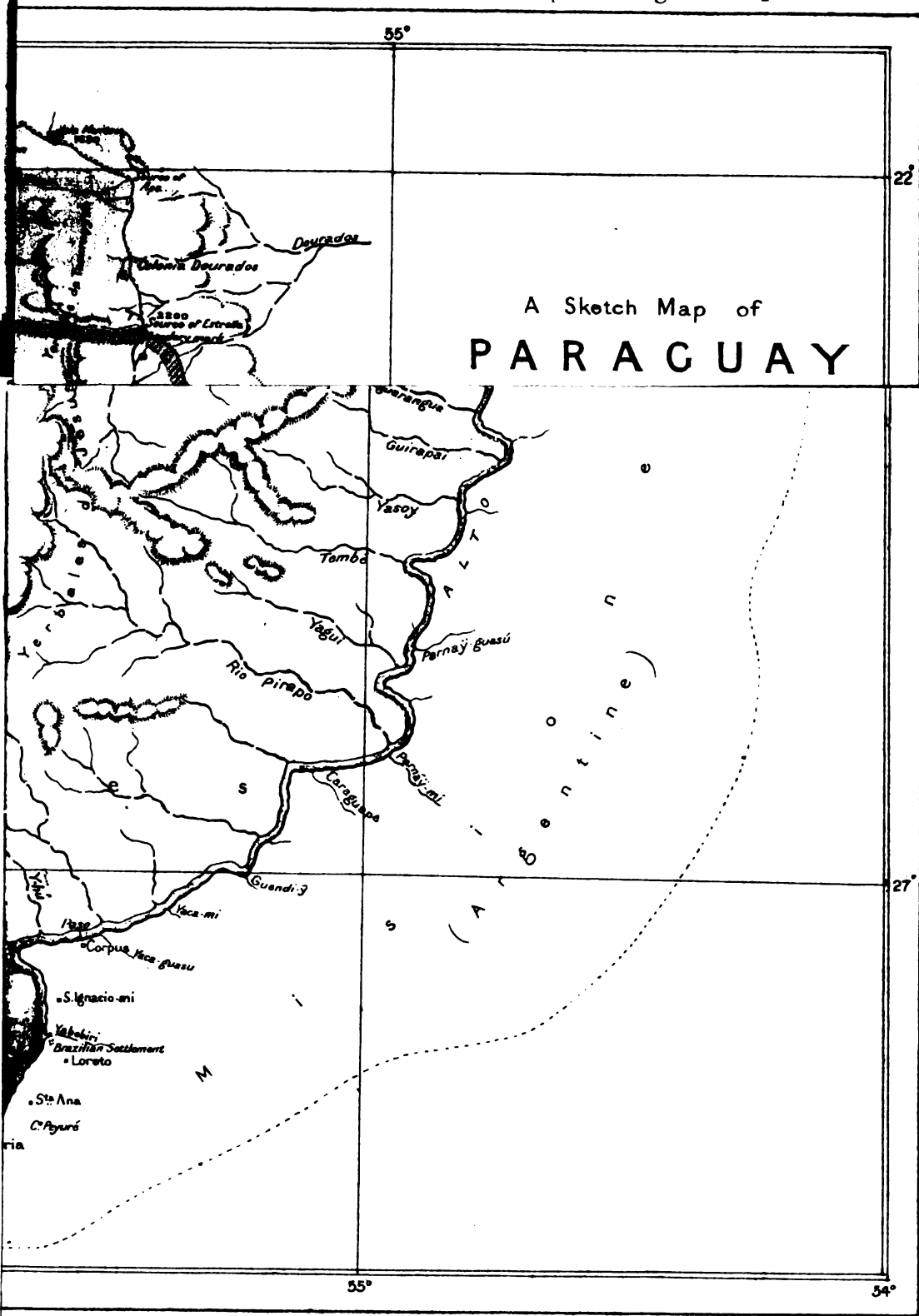
One of the Commissioners employed in this service was Don Felix de Azara, an officer of the Spanish engineer corps, a native of Barbunales in Arragon, who after the completion of the survey of the boundary line, conceived the project of mapping out the whole country of Paraguay. In carrying out this great work he remained for 13 years in Paraguay, and appears to have travelled over the greater part of its extent, determining the astronomical positions of many points, and gathering the materials for his great work, which is still the standard authority, not only for the geography but also on the natural history of this region, and upon which all subsequent works are based.† Azara returned to Europe in 1801.

It was during the presidency of the elder, or Don Carlos Lopez, from 1842 to 1862, that the first careful survey of the rivers Paraná and Paraguay was made. Owing to the ambition of the younger Lopez, the country was involved in a disastrous seven years' war till his death in 1870. In 1871 the remnant of the Paraguayans formed a Congress and Government with the hope of restoring the ruined prosperity of the country. It was at this time that the loans were obtained from England the history of which is so notorious. In the

* A paper read at the Bristol meeting of the British Association. The historical notice is given in abstract.

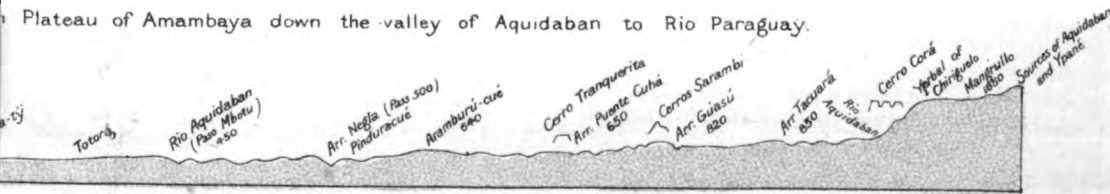
† Azara, Felix de: *Voyages dans l'Amerique Meridionale*. Paris, 1809. I would call the attention of geographers to a MS. volume by Azara, in possession of the Royal Geographical Society, entitled "Description de la Provincia del Paraguay Conquista," and dated 1792: which contains, besides the positions of the villages given in the French work, and some more detailed geographical descriptions, a list of not less than 166 astronomical positions of hills, river fords, and estrancia houses in Paraguay. I do not expect that the whole of these arc points at which special observations for latitude and longitude have been made, but in the case of those which I have been able to examine, the positions are wonderfully accurate. In the map accompanying this paper I have adopted the longitude 57° 40' W. Gr. for Asuncion, in preference to that given by Page (57° 42' 42"); this is the longitude given by a recent Brazilian determination, and agrees closely with that of Azara, which he says was obtained by many immersions and emersions of Jupiter's satellites, eclipses of the sun, and occultations of the moon; in the French edition of his work the longitude is set down at 57° 40' 55" W. Gr., but the MS., to which I have referred, gives 57° 39' 47" W.

A Sketch Map of PARAGUAY



J Bartholomew. Litho

Plateau of Amambaya down the valley of Aquidaban to Rio Paraguay.



suppression of a final revolution in 1874 the Brazilian troops took an active part, and that country has thus assumed a virtual protectorate over Paraguay. My journey into the interior was undertaken immediately after the suppression of the last-named movement.

Entering the Rio Paraguay from the Paraná, the change of river scenery is at once pleasant and striking. Below we have left the broad waters of the Paraná, with its bare banks and willow-covered islands, and now at once, rich, dense, luxuriance of growth shuts in both banks of the tributary; palms and graceful clumps of feathery canes mix with the other vegetation, over which, here and there, great tangled masses of creepers hang down into the water. Animal life, too, is in great abundance in this humid atmosphere: alligators are seen waddling down each bit of mudbank to hide all but the tip of their nose and eyes in the water; here and there a "capivari," or river-hog, disturbed by the advancing steamer, gallops off with its family of little pigs into the thicket, and water-birds of the most varied plumage flap lazily along the banks. At sunset for the first time is heard that spinning, whirring sound of insect life which fills the night air in Paraguay. Multitudes of fire-flies dance along beneath the trees, and mosquitoes render one's life miserable, even in the midst of so much that is new and interesting.

Passing the deep bend of Humaitá, the ruinous church, and the grass-grown outlines of some of the earthworks along the steep bank, are all that remain of this once famous fortress. At Pilar, higher up, the first Paraguayan houses, with deep overhanging roofs, are seen with a dark background of orange trees. At Angostura the first view of the interior of Paraguay is obtained where the Lomas Valentinas rise above the bordering mass of trees on the bank, in undulating slopes of reddish grass dotted over with trees. Soon afterwards the little basalt hill of Lambaré is passed, and then the small craft lying off Asuncion, at the mouth of the lagoon above which it extends, come into view. Seen from the river, the capital of Paraguay has a fine aspect, its white buildings rising on the slope, being thrown out in contrast with the background of trees and underwood. A deep cliff of red sandstone, overhung here and there with a carpeting of rich green creepers, separates it from the shore of the lagoon. On landing, however, the city proves to be very ruinous, its chief buildings, the great palace of Lopez, the Pantheon church, and theatre, being in the same unfinished state in which they were left on the outbreak of the war, and some of them battered about by the Brazilian cannon. The Matriz Church and that of the Encarnacion, old Jesuit structures, are, however, in good repair. Most of the houses are of one room in height and generally flat roofed. The streets, laid out in squares by the theodolite of Dr. Francia, are unpaved, and covered with a deep layer of red sand over which locomotion is exceedingly difficult; the cross ones, running down the slope towards the lagoon, have been so hollowed out by the unchecked action of the rains, as to present the appearance of ravines or torrent beds worn down to the uneven surface of the rock.

It is but fair to state that the present Government (of 1874-1875) has done much to ameliorate the ruinous and filthy condition of Asuncion, by filling

up the cross streets and by draining and cleansing. Not the least effective measure for the general improvement of the town was a compulsory whitewashing of every house.

White-shawled women, bustling about with large red earthenware water-jars on their heads, or sitting in groups in the sun in the open market-places, seem at first sight to constitute the whole population of the town. Some movement is, however, always to be found about the port at the mouth of the lagoon, where the yerba, the chief staple of the country, is being shipped for the ports lower down. This export seems to be increasing, since during last year the customs revenue derived from it rose from an average of \$30,000 to \$56,000 a month. The population of Asuncion, which is estimated generally at 10,000, includes from 2500 to 3000 men of the Brazilian garrison* of occupation, chiefly negro soldiers, who are quartered for the most part on a slope outside the city, and the provisioning of this force gives rise to a good deal of the trade of the town. The non-military part of the male population, which may number about 1500, consists almost entirely of foreigners, whether Brazilians, Argentines, Italians, or of mixed nationality. Paraguayan women, however, of every shade between Indian or negro, and almost pure Spanish, form the bulk of the inhabitants, and the whole of the interior market trade is carried on by them. Hundreds of women, each carrying on her head a basket of some marketable commodity, vegetables, eggs, milk, tobacco, or mandioca flour bread, called "chipa," come into Asuncion from the surrounding country every morning, and occupy the open "plazas" during the day, returning to their homes at nightfall. The water supply of the town is derived from various "pozos," or natural wells, some way outside, and is brought in morning and evening by women, who march in long Indian file lines going and coming, each supporting a large heavy jar on the head.

The chief highway into the interior from Asuncion is the railroad to Paraguari, built in the time of the elder Lopez. For several months previous to April 1874, the railway had ceased working, the line had fallen into disrepair, the rolling-stock was a wreck of doorless carriages and wheelless waggons, which filled the station at Asuncion. In April, however, steps were taken for a partial restoration of the line, a new engine had arrived from Europe, the road was cleared, and trains began to run more or less regularly. At the present time the railway is again in working order, and trains pass on alternate days from Asuncion to Paraguari and the stations between.

The first village outward on the line is that of Trinidad or Ibiray,† a place of from 200 to 300 inhabitants, and possessing one of the finest churches in Central Paraguay—a long building with deeply overhanging outer roof, supported by pillars, having also a second or upper tier of arches carrying a high, central portion of the roof, and with a belfry tower. Trinidad is the place to which the greater part of the cattle for the supply of the neighbourhood of Asuncion are brought, and here is the chief killing-place of the Republic. An average of 900 cattle a month are

* This number was at one time recently increased to 6000.

† Ibirá, tree; y, water—from the name of a small stream flowing from the village to the Paraguay.

despatched here for the supply of the capital and its vicinity. The Salado Valley with the beautiful lake of Ypacaray affords a series of fine pictures. The slopes on each side of it are wooded, and the lower valley of the Salado is filled with a palm forest, but the banks of the lake and the valley of the Piraju have some rich levels of pasture land. A good deal of maize and mandioca are cultivated in patches along the bed of the valley and sometimes the railway passes through long groves of orange-trees, covered with fruit. Luque, Aregua, and Piraju are little villages along the valley, all of one pattern—a square of low, deep-roofed houses, with the church in the midst. Looking into any of them before or after the long midday siesta, when all is quiet, as at midnight, one would certainly see the women busy about the housework, pounding corn, perhaps, in the universal wooden mortar; the few men, with chairs tilted to the wall of the corridor, smoking or taking endless maté

Paraguari is perhaps the most pleasantly situated village of Eastern Paraguay. It lies on the eastern extremity of the plateau of Asuncion, immediately above a level pass which leads from the Salado Valley into a vast level grass plain which stretches away south and east to the Cerros of Acaay. Immediately opposite the village are the Cerro Santo Tomas and Cerro Costa, both covered thickly with wood: the latter has a fine rock peak and precipitous face. Several high, conical hills of wonderfully regular form are seen rising directly from the level plain in the south-east. Paraguari has two chief squares, and its population reaches about 600. As it is the meeting point of all tracks converging from South-Eastern Paraguay towards the capital, it has considerable importance, and, besides its own immediate traffic, it receives a fair amount of transit business, supporting two posadas, while in Asuncion there is only one.

In the outward journey to the Missions we took a south-eastern track towards the village of Ybicui, and for the greater part of the first two days our way led over the great plain of Paraguari. Outside the immediate vicinity of Asuncion there is no road in the sense of an artificially made highway; the whole of the tracks through the country are simply the vague markings worn by former travellers. Here and there in more prosperous times bridges had been made across the smaller streams, but by far the greater number of these have now fallen into decay, and their ruins often render the crossings more difficult than they would otherwise be. Our first experience of passing a large stream was at the Arroyo Mbaey, a chief tributary of the Canabé. We found it too deep to give footing to the oxen, and a delay of several hours was necessary to pass over the contents of the carreta in rough floats made by tying up the corners of a hide. The night was passed in a decayed rancho at some distance from the track.

The Naranja-y is also a considerable stream, deep and slow. Cerro San Rafael, beyond this arroyo, is a round wooded hill, but small in comparison with the two perfect cones of Yarigua-á and-Mi, which rise right and left of it at some distance.

Passing the Canabé, not far from its head, the base of the ridge which bounds the plain, was reached at Costa Peña, where is the home of Señor Duarte, a veteran Paraguayan, who owns the grazing-land be-

tween this and the nearest Cerro Yarigua, and the only herd of cattle we had yet seen settled in the country.

Going on towards Ybicui, the road skirts the base of the wooded hills which rise eastward, and then crosses a low ridge which seems to connect these heights with the base of the knot of Acaay; a flat grassy space between two wooded ridges is then reached, and afterwards nearly a mile of the track is through "banado" or reedy marsh, the water rising sometimes to the horse-girths. Along this line the finely wooded peak of Cerro Tatuqua is always conspicuous. Crossing the arroyo of Ybicui, and ascending the opposite slope, the village of that name is reached. This is also built in two squares, the chief one surrounding the little church. After presenting our passports to the "jues" or second dignitary of the village, in absence of the chief, and receiving his simple hospitality, we went on the track for Caapucu. The land beyond Ybicui is a high, rolling heath. Before reaching the arroyo Itaipa, we noticed several long lines of granite boulders lying on the slopes and knolls, extending in the direction N.N.W. to S.S.E. Some of these were of very large size, 10 feet at least in diameter, and formed of coarse-grained red granite. Beyond the Itaipa a marshy slope leads to another undulating grass heath, with patches of wood here and there. We nighted at some ranchos off the path, where a fine orange plantation showed that a more considerable house had formerly been placed there. The arroyo Curucau, coming from a large estero or lagoon to right of the track, was the next to be passed, and then another series of undulating grass lands, from which a great plain could be seen opening out towards the Tebicuary, on the left.

Before going into Caapucu we visited a caña, or native rum, distillery, about a league from the Capilla. We found the work going on actively: round the house women were busily cutting down the canes from a large patch of ground: these were carried to the crushing mill, consisting of three upright cylinders of hard wood, set revolving against one another by long lever poles, to which oxen were attached. The canes were fed in between the cylinders by hand, and the juice falling into a trough below was conveyed at once to barrels sunk in the ground in a shed close at hand. Another rancho had casks of this juice, in all stages of fermentation, from which a simple retort is supplied. Twelve demijohns a day of the much-prized caña of Paraguay were made at this, probably the largest distillery in the country. The village of Caapucu appears with a high background of hills, for the whole of its department is eminently high and stony; entering it we were surprised to find it almost deserted, long rows of houses in the two squares standing empty and tenantless. The chief, however, told us that his department has 700 inhabitants, although little cultivation is possible from the stony nature of the soil. Between Caapucu and the pass of the Tebicuary the old estancieros of Yaguari and of Cavañas are passed, both of which have fine pastures; the former estate embraces the little range of cerros of Yaguari, from the summit of which the first view of the winding Tebicuary is obtained. Cavañas estancia stretches down over the slope to the river. As illustrating the poverty brought on the country by the war, I may note that Capt. Page, in visiting this

estancia in 1855, says: "We stopped for dinner and siesta at the house of a rich Estanciero, Senor Cavañas, where we met with unusual luxury. Dinner was served on massive plate; water goblets and salvers were also of pure silver. All other appointments of this establishment, though simple, were exceedingly comfortable." The same Cavañas extended his hospitality to us, but his best and only plate is now a tin dish, in which a little "charque," or dried beef-strings, was served, with a few oranges, our host sitting on his bed the while, for lack of other furniture.

Approaching the pass of the Tebicuary we met a large drove of horses from Corrientes, being driven to Trinidad for sale. A number of deep ditches and waterholes on the north side of this pass render it exceedingly difficult in wet weather or when the river is high. Whilst we were passing two carretas simultaneously became fixed in one of these ditches, and one resisted the efforts of eight pairs of oxen to drag it out. The river at this pass has a width in its lowest stage of about 80 or 90 yards, and a depth of from 12 to 15 feet; almost all the little traffic from Southern to Central Paraguay must cross the river at this point: carts and passengers are ferried over in two little canoes, maintained by a government guard-house on the southern bank; oxen and horses pass by swimming.

A vast grassy plain, perfectly level, is crossed in the 10 miles which separate the pass from the little group of hills of San Miguel. The Tebicuary, curving round from the confluence of its chief tributaries, encloses this plain, which forms the northern corner of the Missions territory. Its grass, in contradistinction to that of any other part of Paraguay that I have seen, seems specially adapted for sheep, being of fine texture and short; in all other parts the grass is rank and high, only adapted for cattle grazing.

San Miguel is a little village in the department of Santa Maria, situated in the midst of a number of little wooded cerros; in one of these an iron mine was formerly worked. Its one square, surrounding a little church, has now about twelve inhabited houses.

From this our way outward led over a high undulating ridge which forms part of the division of the waters of the Tebicuary basin, and those which flow to the swamps of the Paraná. Dwarf "yatai" palms begin here to be dotted among the grass, the highest scarcely 3 feet above the ground; deer and ostriches appear now and again in herds, for these solitudes are seldom disturbed by passengers. Santa Maria with its high cerro behind it, and San Ygnacio, also on rising ground, may both be seen from this ridge. Farther on some portions of the long straight ditches, cut over hill and dale under the Jesuit rule, to mark the limits of the different departments, may still be traced. Santa Rosa at the present time is an almost uninhabited square of decaying houses, but the church, which is one of the most elaborate of the old Jesuit structures, dating back to 1698, is in comparatively good order. Like all other large churches of the Missions, which have been built after one pattern, with differences only in detail, it is in form of a long cross (about 90 yards) with a very short nave, and with a college square adjoining one side of it, all with deep roofs supported by outer pillars, forming

shaded corridors. A deep porch overhangs the chief entrance doors, which are large and massive. The interior roof of this, as well of the church, is elaborately painted in highly coloured frescoes. Carved wooden pillars, placed at intervals along the length of the church, support the roof, and these with the other beams look as fresh and new as if cut yesterday, testifying to the solidity of Paraguayan timber. The chief altar, as well as the confessional boxes and pulpit, are specimens of elaborate carving, representing fruits and flowers, and the six almost life-size figures of saints which fill the niches in the chief altar, are some of them exquisite in attitude and expression. Wrought-iron work of the most intricate sort is used in every instance for hinges or locks or ornamental gratings over the windows, showing that the smith's art must have been carried to perfection. The Paraguayans are now absolutely ignorant of any one of the arts so well displayed in the Mission churches, and the question naturally arises what has become of all this race of artificers, for they must have been natives, though taught by the Jesuits.

Little more than a league south of Santa Rosa is the entrance to the "Potrero,"* or enclosed pasture camp of San Antonio, the only land south of the Tebicuary which does not belong to the Government of Paraguay. This potrero is enclosed by the arroyos Picuiry (minnow river), coming from near San Ygnacio, and the San Antonio, from the hills of Santa Rosa, which meeting form the river or marsh drain of Yabebiry (ray-fish river) flowing to the Paraná. The northern side of the potrero, which is more than 50 square miles in area, is shut in by a mass of dense forest which lies south of Santa Rosa and San Ygnacio. Over the whole interior space there are scattered "islas" or clumps of fine woods, occupying perhaps a tenth of its surface, the remainder being covered with tall, rank grass. About 1000 cattle and horses, the largest, and one of the very few herds now in Paraguay, were kept till recently in this potrero; but having such an immense space of country to roam in, the cattle had become almost as wild as deer; the woods round it are also infested with jaguars, and in riding over it the horses would often start at a strong scent, or tremble and peer about in fear. In making our way to Encarnacion, after a stay in the potrero, we regained the track which passes Santa Rosa, where it skirts the base of the line of round wooded cerros, which extend south-east to opposite the little oratorio and ranchos of San Patricio. After crossing some of the branches of the great swamps of the Paraná, which run up into the country, the chief being the estero of Timbory (*Timbo*, the mimosa; *ry* or *y*, water), we reached the estancia of San Ramon, where there is one good house and large naranjal remaining, with several ranchos in its neighbourhood. Descending from San Ramon to a lowland, which, however, is still at some height above the Paraná, two long days' plodding through esteros and mud, and rounding the borders of dense patches of forest, were required to reach El Carmen.

Midway in this route the arroyo Curuniai, stagnant and ditch-like, but deep, was passed: the

* The name "Potrero" is given to spaces of pasture land which are enclosed naturally by wood or water, or both, on all sides; and they are valued highly as properties on this account, because cattle cannot easily stray from them.

Aguapé-y (*aguapé*, a lily-like water-plant with blue flower) is a more considerable river, with a strong current, and had to be crossed by swimming. An old estancia house near the Aguapé, belonging to the family of Barbosa, is still occupied by the lady of the former estanciero, who with his sons fell during the war; this is the most farm-like and comfortable habitation we saw in the Missions, where everything is ruinous and poverty-stricken in the last degree. Here—as in almost every rancho throughout the country—the women employ the leisure of the long evenings, seated on the ground about the wood fire, in spinning cotton thread by the aid of a little weighted spindle, the loose, cleaned cotton being wound round one arm and twisted by that hand while the spindle is rotated and dropped by the other. The larger houses have a rude hand-loom, in which cotton cloth of various textures is made for ordinary wear. Hammocks are home-made, also, a large frame being used over which the double longitudinal threads are stretched, the cross ones being worked in by hand in various patterns.

From a height a league west of El Carmen, a fine view opens out in the valley of the Paraná. On the Paraguayan side, the hills falling steeply down to the river, have a splendid alternation of dark forest and lighter pasture: grassy heights also slope gently from the Correntine side to the river, which appears at intervals in the landscape like a chain of lakes.

The river Tacuary (cane river), to which the track now descends, is fordable when low, but requires a canoe at other times. El Carmen, lies on a slight elevation in the midst of a low marshy plain, at a distance of a league from the Paraná. This must, however, have been a considerable place at the time of Page's visit to it in 1855, for he sets down its population at 1000. Now it well exemplifies the change that the war has brought over the once populous district of the Missions, for it has only two habitable houses, one the Guardia, the other kept by a woman who is custodian of the little church, eleven people making the total of its present population. The chief of this little place counted the inhabitants of his department on his fingers, numbering off fifteen houses or ranchos sheltering 55 persons in all, of whom 20 only are "barones." The few people gathered about here seem more than half Indian in cast of features. Last season only enough tobacco was grown in the department to keep the people in smoke, and the quantity of maize and mandioca was not sufficient for their wants.

After a short distance over the marshes of El Carmen, the Encarnacion track rises to cross the first of a long series of ridges and valleys, each with its arroyo, which terminate on the Paraná close by. These are the final spurs of the great dividing ridge or cordillera which comes down from the table land of Brazil. Indications of copper and perhaps also of some other minerals were seen in descending the water-worn track to some of the arroyos; indeed this whole series of ridges appears to present very interesting geological formations, giving perhaps an epitome of the whole cordillera. Two considerable rivers, the waters of which are sometimes backed up by the rising Paraná, the Y-hú, or "black water," and the Mboi-caé ("roasted snake"), are passed by fords near their mouths. The smaller arroyos between these and El Carmen rise and fall very rapidly, but

one only, the Caraguata-y sometimes interrupts the passage of the road, when a pass lower down named the Lavara, close to the Paraná, is used, provided that river is not flooded.

Encarnacion, founded in 1614, and once a leading reduction of the Missions, is now nearly deserted, only about a dozen of the many houses remaining in it being occupied. The place appears to have been well filled before the war, but most of its former inhabitants have now crossed the river to the new settlement of San José, or Ytapua. The old Jesuit temple of Encarnacion, taken down in the time of the elder Lopez, must have been a building of vast proportions, to judge by the exceedingly massive stone foundations which remain. The college squares beside it still contain almost the only inhabited houses. Its department, which extends east to the river Santa Maria, has a good number of "chacras," or small farms, growing tobacco, maize, beans, and mandioca.

A descent of about 150 feet from the village brings us to the river bank opposite to the Correntine village of Ytapua. Both the hill of Encarnacion and that on which Ytapua rises appear to be of old volcanic formation; the lava of which the foundations of the temple are chiefly built, appears on the Ytapua side. Some fragments of coal, which had been found in the neighbourhood, were shown me with great ceremony in a rancho on the Paraguayan bank, but they seemed to be pieces of burnt shale. The river here presents a magnificent expanse of water, 3000 yards across: the cattle ferry employs two small steamers which tow barges with corrals or pens placed on their decks, into which the cattle are driven down a gangway: about 20 canoes and small boats are also in use at the pass. A steep ascent of about 100 feet leads up through the settlement of Ytapua, or San José, a bustling, thriving place, apparently in rapid growth, and consisting now of a collection of rough sheds and ranchos, with perhaps 500 people in all—Argentines, Brazilians, and Italians.

Paraguay is now, and has been since the war, altogether dependent on outer countries for its beef supply, and almost the whole of this is derived from the Argentine province of Corrientes.

Cattle are brought across the river into Paraguay, by all the passes of Paraná, from the confluence of the Paraguay, up to the highest pass, that of Corpus, but this crossing of Ytapua is one of the chief, and by it an average of 40,000 head of cattle are annually ferried. From the Paraná, the herds are driven northward, chiefly to the centres of Asuncion (or Trinidad) and Villa Rica, but the whole of northern Paraguay, up to the town of Concepcion, is also dependent on Corrientes.

On the return journey, after passing again through El Carmen and over the Tacuary, we left the former track to turn south-west towards San Cosmé. Undulating slopes of tall grass, with patches of wood, occupy the country, till a descent is made to a wide "estero" reaching up from the Paraná, which must be crossed before the Aguapé-y is again reached. Here the Aguapé has become a deep, dark, slow-moving river. A dug-out canoe is stationed at the pass to San Cosmé, which lies on an ascent beyond. This reduction (founded in 1634) has the usual square, the church and college buildings;—all are in tolerably good

repair, but most of the dwellings stand empty, the whole population consisting of 3 men and 30 or 40 women. The church and colegio are remarkably fine; they are built with outer corridors, supported by squared columns of red sandstone, each 12 feet in height and about 16 inches square, with bevelled corners and massive capitals. Four columns which support the roofed gateway of the college buildings are much higher. The church contains much carved work and gilding, with many figures of saints, particularly of San Cosme, who is represented with salve box in hand. Many inscribed stones mark graves beneath the flooring; 20 great beams of lapacho, each from 25 to 30 feet in height, support the roof internally. During the war the whole of the people of this partido migrated to the district of Yuti, but a sort of re-exodus took place in 1869, when about 300 women marched back to their old district, each bringing a little grain or vegetable seed to recultivate the "chacras." The tobacco grown here is of a very superior quality, and is taken to market at Ytuzaingo or Ytapua, from a boat port about 1000 yards from the village. A land track through the marshes, formerly used between San Cosme and the pass of San José-mi, lower down the Paraná, is now impracticable.

Our way from San Cosme north-westward led along the borders of the vast marshes of the Paraná partly through the edge of the "estero," and partly over the wooded or grassy elevations which run down into it. The estero, viewed from this track, presents a dead level meeting the distant horizon, covered with tall grass or reeds, and with patches of open water here and there with aquatic plants, and is well-named Neembucu, the "endless." That part of it nearest San Cosme has the local name of Capii-pytá (red reeds). After three hours of plodding through the marsh, the Curiniai was again crossed. On a height beyond it, a track branches off at some ranchos called Ivira-ee-a-cuá (the place of the scent of the incense tree), to the district of San Luis. Another long stretch of marsh brought us to a height on which the estancia house of San Miguel is placed. Here an Argentine has settled, and keeps up a small farm with a few cattle, but his horses have all recently been destroyed by a disease known as "mal de cadera" which has done great mischief in Paraguay. Formerly a direct track led from San Miguel to Santiago, but this is now impassable on account of the depth of the marshes; the only way thither from this point is by a long detour through San Ramon. Even by following this roundabout way we could not altogether escape the swamps, and the deep estero of Piri-ty (the "reedy place") had to be crossed. This, though only half a mile in width, proved to be the worst of any we had yet encountered: it is covered with tall reeds, growing out of deep mud, in which the horses sank to the saddle, and it was only by wading up to the waist, and by dint of vigorous thrashing, that the animals could be got to flounder through it.

At Yacuti, a little cluster of ranchos two leagues from San Ramon, the track to Yuti branches off to the right, and not far beyond, a path leads to the estancia house of San Martin, where the main route southward to Santiago is struck. This main track lies over a high and uniform grass ridge as far as the capilla, which stands on a knoll of rather higher ground, descending at once on the farther side to the estero

of the Paraná. The church and village of Santiago are the largest and most solid relic of the Jesuit work in the Missions. The interior elaboration of the church is perhaps even greater than at Santa Rosa: a few of the vestments, worked in gold and silver, remain; but the greater part of these, along with the whole of the silver furniture of the Mission churches, were seized by Lopez in the general conversion of everything of value in the country to war material; even the larger bells were melted down to be cast into cannon.

The "gefe" estimated the population of his department of Santiago at about 500, of whom about 100 are men; in the Capilla there are about 50 persons. This department must have been exceedingly populous in former times, since in the first enlistment made by Lopez for the war, 600 men between the ages of 15 and 25 years were furnished by Santiago.

From Santiago, unwilling to make another detour by Santa Rosa, we obtained a guide from the "gefe" to show us a pass on the arroyo San Antonio in a direct line to the potrero, but long unused. Riding a league or two west, over grassy heights separated by branch esteros from the Neembucu, we came to the San Antonio, and after some search among the high reeds on its banks, our guide pointed out the pass and left us. Gaining the opposite side with some difficulty, we found ourselves in an estero of tall reeds, which rose above us on horseback. Five hours were occupied in getting through this reed marsh, in which deep ditches from the arroyo seemed to meet us at every turn, and from the height of the vegetation it was almost impossible to know in what direction we were moving; only by standing on horseback could we occasionally obtain a glimpse of the woods beyond the estero.

A few days were occupied in examining the neighbourhood of the potrero San Antonio, and in laying in provisions, for this is the only place where we could get beef in the Missions; elsewhere mandioca and oranges are the staple food. The old reduction of San Ygnacio (built in 1610), which was our next halting point, differs in no way from the other Jesuit villages; and of the church it is difficult to say whether it displays more or less laborious carving and sculpture than the others. The place is now almost deserted, though there are houses enough in excellent repair for a large population; only about 20 people are resident. Santa Maria, which we next visited, is in almost precisely the same condition.

As far as Caapucu our return route was nearly the same as that taken in coming south; but from that place we struck northward for the village of Quiindi. In the valley between Cerro Leon and Cerro Medina we came upon two shafts, which were opened some years ago in search of mineral, but though pyrites is abundant, no other mineral has been found in quantity sufficient to repay working. Passing up the grassy or stony valley of the Apichapa, and crossing it not very far from its source, we ascended a steep high ridge on the opposite side, and from the summit obtained a magnificent view over the hills of Caapucu, which fill up the whole of the country west of us in a succession of groups of wood-covered hills and deep green valleys. Here and there, continuing our route along the grassy highland, we had views of the immense sheet of Laguna Ypoá (the "lucky water"), which appeared to touch the

western horizon. The only considerable rancho in this track is that of Lovera, where we found a welcome. The first district of Quiindi, called the Valle Apuá, has a number of ranchos situated prettily on a wooded ridge. The Y-pucu (long water), a brawling stream, and the Yacaré-y (alligator river), are crossed in a wide pastoral hollow before the little rising ground of Quiindi is reached. All along the route the knot of hills of Acaay stand out in sharp definition in the north, dark with the dense woods which cover them. The village of Quiindi, which has about 200 inhabitants, is in the form of two squares, one outside the other, enclosing a little barn-like church. The contrast between the flimsily-built houses of the lay reductions north of the Tebicuary, with the solid and regular structures in the Missions cannot fail to strike one.

A path leads hence through a most beautiful succession of woodland views to Tabapi, across the valleys of several little streams, flowing to the great Laguna. Here, for the first time, coming from the south, tall, graceful palms are seen among the forest trees. We found this little village, which is a sub-capilla of Carapegua, in fiesta over the making of miel or cane-syrup. It was the harvest of a small proprietor in the neighbourhood, and the whole of the inhabitants were assisting him to boil down the cane juice extracted in a little ox-driven crushing-mill. The boiling is kept up day and night, till the canes come to an end, and the occasion serves as a holiday for the whole neighbourhood. From a height a little outside the village, a fine view is obtained over the great lagoon of Ypoá, to the eastern margin of which the hills appear to descend. On the road hence to Carapegua the Tabapi arroyo from the Acaay hills is crossed, and to the left a great, low, plain opens out round the head of the lagoon; a wooded ridge is then climbed, and descending the opposite slope we come to Carapegua. This place showed more life than any village we had yet seen outside Paraguari: two or three stores seem to thrive, and its market-place looked busy; its population appears to be between 300 and 400, that of its department, which includes the district of Tabapi, being estimated at 1000. The department is also rich in the usual products, tobacco, maize, &c., upwards of 2000 arrobas of tobacco having been collected for sale in it during the past season. A slight descent from the village brings us again to the great uniform plain of Paraguari, in reaching which village from this point the two considerable fords of the Cañabe and the Mbaey are passed. In returning from Paraguari to Asuncion we took a direct road, which leads up over the centre of the plateau. Before reaching Jaguaron the path lies through a dense forest on the plateau, in the midst of which the unfortunate German colony of 1871 was planted. The conspicuous numbers along the path marking the lots of forest to be cleared are now almost the only signs of the colony remaining; but two or three indefatigable Teutons have, at a prodigious expenditure of labour, cleared little plots of ground in this wilderness, and live there in spite of all difficulties. A great drawback to the locality, besides that of the heavy timber, for which there is no present market, is the total absence of water, which is not to be got within a league of the colony. Jaguaron, prettily situated on the southern side of the plateau, with the sandstone hill of Dos

Cruces rising above it, is an extensive village, with a huge church; but very few inhabitants remain, and to business of any sort it is absolutely dead.

Ytá, farther on, is a bustling place, with a busy market: it is here that the red earthenware "cantaros," or water-jars, which are used in every part of the country, are manufactured from clay found in the neighbourhood. San Lorenzo is also a flourishing, clean-looking village square, in which every house seems to be occupied. The straight track to the capital between these places is cut partly through fine woods, and on each side orange plantations, and ranchos with little cultivated plots, become more frequent; the road also becomes lively with passengers as Asuncion is approached through this most populous district of Paraguay, lines of white-dressed women going in single file, at a half trot, to or from market along the sandy track beneath the shade of the overhanging trees, and always merrily "chaffing" one another as they go.

On returning to Asuncion I learned that the Paraguayan and Brazilian Boundary Commission was about to start for a final journey to the northern frontier, and availing myself of the opportunity, I requested and obtained permission from the Government to accompany this Expedition and to draw supplies from the general commissariat for myself and an assistant. This Limits Commission, consisting of a section representing each country,* had been in operation already for two years. Its labours consisted in exploring and surveying the line of frontier decided upon after the war, in 1871, extending along the line of the Rio Apa to its source, and following the water-parting of the main cordillera and that of its branch, south of the basin of the Rio Ygatimi, to the Salto Guayrá on the Paraná. The most severe portion of this arduous task was in cutting a way through not less than 40 leagues of the dense forests which clothe the cordillera and the eastern slope of Northern Paraguay, and in finding and mapping the precise line of water-parting, a labour which required six months of constant work, and which was one of peculiar difficulty, since no food for the transport mules, other than the topmost leaves of the "Pindo"-palm, could be found for them in the forest, in consequence of which more than a hundred animals died of starvation. The line of frontier was subsequently marked at various prominent points by columns built by the Commission: one had been placed in mid stream at the mouth of the Apa, others at the source of the Ygatimi, at the pass of Espadim on the cordillera of Maracayu, and at a point midway between that and the Salto of the Paraná. Three central marks remained to be built—one at the confluence of the Apa and Estrella, another at the source of the Estrella on the cordillera, and a third between the sources of the Ypané and the Amambaya, in a space called the potrero de Julio.†

* The Brazilian under Colonel Galvao, the Paraguayan under Captain Ortiz; the cost and labour of the work have been incurred by Brazil, the Paraguayan section being only a formal accompaniment.

† The astronomical positions of each of these points were carefully determined in the first journeys of the Commission in a series of observations made by the Brazilian Major Araujo, who was formerly employed in the same service in laying down the Brazilian and Uruguayan frontier. The instrument employed in fixing the longitudes was a large transit which was set up in the meridian at each station. The survey of the fron-

This final journey was therefore planned to visit these points in succession, starting from and returning to Concepcion on the Paraguay. The Commission, consisting of 40 Brazilian and 10 Paraguayan soldiers, with their officers and a commissariat, with 16 ox carts and a troop of about 200 head of cattle, reached Concepcion on the 29th of July. This, the most northerly inhabited village of Paraguay, is formed of four or five streets, running back from the low bank of the Paraguay, crossed by others at right angles, forming house blocks of about 50 yards a side. Its largest buildings are two old "cuartels" or barracks, which face the grassy plaza, both very ruinous. Most of the habitations are merely mud ranchos, but there are a few substantial houses and at least three good stores. The number of occupied dwellings is about 150, and of the inhabitants about 600, of whom two-thirds are women. The working people of the place are for the most part Italians. At one time Concepcion was the depôt and seat of export for the northern "yerbales" of Paraguay, but this trade has all but ceased to exist, and only the morning and evening, drum and whistle, reveille of the guard stationed here, breaks the sleepy monotony of the place.

The country through which we passed from Concepcion north-eastward to the Rio Apa presents such uniform geographical characteristics, that a description of the track in detail seems superfluous. In general the land is undulating, being covered by low, gently swelling ridges, trending westward from the base of the central plateau; these are separated either by wide basin-like plains or the shallow depressions through which the streams and rivers flow westward towards the Paraguay. No part of it is mountainous or even hilly, and the "Sierra de la 15 puntas" laid down in M. Mouchez map seems to have no existence whatever; only in the far distance of the eastern horizon a few outliers of the plateau are to be seen. Narrow belts of wood cover the ridges and follow the streams, but between these, and occupying by far the greater part of the surface, are great grass camps frequently dotted over more or less thickly with straight-stemmed palms, generally the "caranday" or "coco." The woods of this section are as a rule disappointingly small, an exception being made of a belt of forest of heavy timber, which covers a ridge beyond the ranchos, marked Rincon on the map, near Concepcion.

The soil, being uniformly of a reddish or whitish sand, is dry and porous, and the grass, though it presents a luxuriant appearance, inclines to grow in tufts, each separated from the other by a few inches of bare sand; the camps are, however, traversable in any direction, swamps being quite unknown. For a few leagues beyond Concepcion ranchos with little plots of cultivated ground are frequently seen, and at Naranja-ty (the place of oranges), so named from the number of orange plantations about it, quite a small village is formed on each side of a little valley, but beyond this, nearer the Aquidaban the dwellings are fewer, and there they cease altogether. Between the Aquidaban and the Apa there is not now a single inhabited dwelling, though the posts of a few former estancia houses are seen at long intervals, as at

Casal-cué, Ramocué,* and Sorat. The most noteworthy points on the route are the crossings of the Aquidaban and of the Apa; the pass of the former river used in this route is that known as Paso Mbotú (the name of a troublesome horse-fly which infests its vicinity): it is reached through the belt of wood which skirts the banks, and the river presents a fine appearance rushing down with brawling current between its steep banks of red sandstone, overhung with a dense vegetation, in which light palms and tall graceful canes interchange with the more bushy and darker forest trees or matted creepers. At the pass it is from 40 to 50 yards in width, and the depth in its normal state is about 3 feet, but after rain it rises with great rapidity. Another pass, named the Barreto, is used a few leagues lower down on a track which runs parallel with the one we followed, and which was the route taken by M. Du Graty in 1855. The Termentina, a considerable stream, stagnant and ditch-like at the pass, and about 15 yards wide and 3 feet deep, is the largest tributary of the Aquidaban, crossed on this line. The Apa is reached at the old military station of Bella Vista, the blackened house-posts of which stand nearly overgrown with vegetation: the river flows immediately beneath in a deep bed, with richly-wooded banks. At the pass the width between the steep sandy banks is about 25 feet, and the bed is strewn with large pebbles.

Unlike the Aquidaban its current is slow and regular. Scarcely a league above this pass is the confluence of the two head streams of the river: the one, still named the Apa by the Paraguayans, is a deep and slow-flowing stream coming from the north-east, its channel being the direct continuation of the lower river; the other, the Estrella, rushes in from south-east, with shallower waters, but a much more rapid current. On the first arrival of the Commissioners at this point, a geographical question arose as to which of these heads should be considered as the source stream of the Apa, and it was not decided in favour of the Estrella until after much debate and a careful survey of both tributaries. According to previous determination, one of the boundary marks was now built on the high promontory formed by the confluence, the red sandstone used being quarried from the bank of the Estrella beneath.† Some heights, scarcely to be called hills, rising northward of the Apa Valley, afford a wide view over camps and wooded ridges in the north and west. The track followed from the pass of the Apa towards its source, and the only one which has been opened in this direction, is the route from Paraguay to the Brazilian village of Miranda. It leads across the valleys of the northern tributary streams, at no great distance from the upper Apa. These arroyos are rapid streams, not large enough in themselves to form any obstacle to passage, but their valleys are deeply cut and narrow, their channels rocky and

* The terminal *cué* signifies abandoned, but in some instances it remains part of the name of a place, which though deserted at one time may have been re-occupied.

† The boundary columns are built on the uniform pattern of a square pillar 3 metres high, resting on a double basement of 2 metres square at the lower tier. The sides of the columns are placed to face the cardinal points accurately, and are inscribed "Imperio de Brazil" on two faces, "Republica del Paraguay" on the others.

tier had not yet been submitted to the Brazilian Government when I left Paraguay, so that I have not been able to make use of it in the sketch map.

broken, the ridges between being generally high and steep, partly wooded and partly grassy. From the summits of some of these separating heights, magnificent views are obtained across the valley of the Apa and Estrella, over which continuous forest, in every shade of green and brown, undulates away into the blue distance, where the dim outline of the Cordillera closes the view.

At the torrent called Arroyo de Oro by the Paraguayans,* which is one of the most difficult to cross, on account of the steepness with which its sides fall and rise, the Miranda track was left for a path made by the Commission of Limits, leading to the sources. A distinct edge of the plateau (shown in the section) is reached at a distance of about 7 leagues from the head of the Apa, where the track, cut through a forest of splendid trees, climbs up a steep, almost wall-like ascent of 600 feet. Reaching the plateau, the land is again undulating and grassy, and a swelling ridge in the distance is pointed out as the highest ground. Making towards this, we passed over a high grass plain, which, descending gradually to the woods on each side, divides the waters of the Apa from those of the Brazilian River Mondego. The highest grass ridge is at length reached: a hollow in its side allows a long belt of wood to run up from the great forest of the basin beneath, and at the head of this, a clear little rill, gathering from the grassy sides of the depression, is the source of the Apa. We had now reached the summit of the plateau of Amambaya, and the water-parting of tributaries of the Paraná and the Paraguay; it may be compared to a broad green avenue of one or two miles in width, covered with small flowering plants and tufts of grass, curving with a gentle descent to right and left, where, at intervals, little hollows occur, each filled with a clump of wood. Round these heads of wood on the upper side a crescent of rich green grass invariably appears, and in these marshy "manantiales" the waters collect to form a source stream. This appearance of the water-parting is maintained almost without variation, as far south as the Potrero de Julio, beyond which the forest covers over the whole plateau.

At one place only the water-parting line was deviated from, to visit the little Brazilian colony on the bank of the Upper Dourado. It consists of a dozen mud ranchos, formed in two sides of a square, with a better log-house for the officer in charge of the 30 negro soldiers who compose this colony or out-post. No cultivation seems yet to have been attempted at this solitary spot, and supplies are drawn from Miranda.

The next boundary column was placed on the grassy water-parting between the chief head wood of the Estrella and that of one of the heads of the Dourado. A continuance of bad weather delayed us in this spot for three weeks; it seemed to be a battle ground for the hot north-east and cool south-west winds, and, from one side or other, fierce thunderstorms rolled up continually. The mark was no sooner built than a violent storm threw it down; it was built up again, and this had scarcely been done, when a furious gale, accompanied with vivid lightning and large hailstones, set in, levelling our tents and flooding the ground.

* The Brazilians have given this name to the arroyo next to this one, nearer the source of the Apa.

This lasted during the whole night, and when morning broke, the column was again a heap. A small stinging fly is bred in myriads along the source marshes: its bite raises a little blood blister in the skin, which itches incessantly, and in fair weather from daybreak to sundown they are an intolerable pest. These flies gathered in clouds over the mules and horses, driving them often almost to madness, when they would break their tethers and gallop off to be rid of the plague. Between the source of Estrella and the Potrero de Julio, the only point of mark is an "isla" or large clump of wood in the midst of the grassy water-parting, called the Punta Poná (the beautiful spot), close to which there is a little lake. The portions of the water-parting immediately south of this, round which the head woods of the sources close in, are named the Potrero Capivari and Potrero de Julio, the latter name having been given by the Limits Commission. The mark placed here is at a point near one of the heads of the Ypané, where the hollows forming the heads of two streams of the opposing sheds are only a few yards apart.

At the southern border of the Potrero de Julio the woods close in, and the plateau becomes covered with forest over its whole surface. Here the picado or wood path, formerly cut by the Commission, begins and extends with little intermission to the Salto Guayrá. Under the guidance of the leaders of the Paraguayan section we went to see the "Picado," but on arriving at the edge of the forest it was found to be so completely changed in appearance during the twelve months that had elapsed since the path was used, that the entrance of it could not be recognized. After some search within the wood a part of the track was found: fallen trees and rapid undergrowth had already almost filled it up, but we were able to follow it for about a league. The first mile was through forest of splendid timber, by far the largest yet seen in the country, with massive, tall, and straight trunks: next we came to a "yerbal" mixed with smaller trees, but afterwards the large forest again resumes. The farthest point was the site of an old camp of the Commission, which had an interest since it was here that, in the first journey, a band of 40 bowmen of the Canguá Indians, sent by their chief, came to demand the reason why these paths were being cut through the solitudes of their domain.

The utterly desolate character of the whole region of Northern Paraguay through which we had passed is perhaps its most striking feature. A few wandering Indians are said to inhabit the forests in the extreme north, and occasionally we were told by the Paraguayans keeping watch by night over the cattle, that our camp had been reconnoitered by these timid nomads, whom they recognized by their calls, in imitation of birds; but I am inclined to set down these stories to the prevailing "bombero" superstitions of the country. Animal life is also extremely scanty. A few herds of small deer and droves of wild pigs were the only representatives of larger game that we saw, with the exception of one "anta" or tapir which was shot; and not even a foot print of the jaguar was observed. The "inuitou" or wild turkey is common enough in the woods, and these with the "tatu" or armadillo, and the large lizard called "tedju" afforded an occasional change of diet. Excepting the bell note of the "campania" bird in the forest, and the melancholy

whistle of the "cogoeé" or wood partridge at sunset and dawn, the country is perfectly silent.

In returning, after the completion of the final boundary mark, the Commission retraced its route as far as the Punta Poná, from which a track turns westward, following the dividing ridge between the basins of Aquidaban and of the Ypané. The first return camp was at a point called the "Mangrullo," where there are still the tall posts of a look-out tower used in the time of Lopez's retreat to these wilds. Immediately beyond the Mangrullo the great yerbal of Chirigué is entered, and, for about a league, yerba trees are thickly scattered among the others of the forest; immediately afterwards, the track plunges down a steep forest slope exactly like that which we had ascended in reaching the source of the Apa, and of about the same height. On emerging from the dark thick woods at the base of this descent, we found ourselves in the midst of the hills of Cerro Corá.* The scene is wild and beautiful in the extreme; castellated crags and cones of the most fantastic shapes, densely wooded from base to summit, excepting where the red sandstone precipices appear, circle round a wide area through which the arroyo of Chirigué makes its way to the Aquidaban. The woods on the higher grounds were dark and dense, but below, the bases of the hills are marked out with curving lines and belts of light feathery palms bounding the grassy knolls of the central space.

Apart from its wild beauty, the spot has an intense interest as the scene of the last closing act of the long seven years' war which ruined Paraguay. It was here that Lopez when driven back into the deserts with the little remnant of his followers, made his last camp, where he was surprised by the Brazilian cavalry, and where he was killed whilst running down to escape to the hills by crossing the arroyo Chirigué. The site of the camp, about 10 minutes' ride from the Aquidaban, is still strewn with the undisturbed wreck of everything that belonged to it: carts, broken guns, and camp furniture of every sort, with numbers of skeletons lie scattered round. The sufferings of this last remnant of the Paraguayan army may be realised in following the track between this camp and the former one of Panadero, for under every shade-tree along it are the untouched bones of men who have lain down to die of wounds, weariness, or starvation.

KEITH JOHNSTON.

(To be continued.)

PARIS GEOGRAPHICAL CONGRESS.

ON the 1st of August, 1875, was opened, in the Salle des États, the ancient House of Estates in the Tuileries, the second "International Congress of Geography and kindred Sciences." The first Congress of this kind had been held in Antwerp, in 1871, almost immediately after the termination of the Franco-German War. The honour of having suggested this meeting belongs to M. Ruelens, and its successful issue to M. Hane Steenhuyse, supported by an active and influential local committee. Geographers from the principal countries of Europe met

at Antwerp, a valuable collection of maps and other objects was brought together for exhibition, and a desire to convert this Congress into a permanent institution was general. Paris was chosen as the next place of meeting, and whether we look to the general accessibility of that city, to the geographical treasures which it contains, or to the universal attraction which it exercises upon all, no better choice could have been made. The Paris Geographical Society readily undertook the task of organising the next meeting, and Baron Reille accepted the arduous duties of General Manager or Commissaire Général. He was supported by 22 Commissaires, by a General Committee numbering no less than 162 members, and by an Honorary Committee of about 150 members. An "Executive Commission," presided over by Admiral de la Roncière le Noury, the President of the Paris Geographical Society, exercised general powers of control. The General Committee was subdivided into five sections (sections scientifique, d'organisation, d'exposition, de publicité, and de comptabilité). The scientific section again was divided into seven groups, for (1) mathematical geography, (2) hydrography, (3) physical geography, (4) historical geography, (5) economical geography and statistics, (6) didactic geography, and (7) travels. This complex arrangement had no doubt been considered carefully. Unfortunately it did not work very smoothly, and we have not attended any Congress where the arrangements, as far as the comfort of the members is concerned, were so unsatisfactory. There was no daily programme, no printed notice of papers to be read, and no list of members or their Paris addresses.

At the inaugural meeting, M. Hane Steenhuyse, the outgoing president, took the chair. He was supported by about a dozen members of the old committee. Having rendered an account of his stewardship since the Antwerp Congress, he resigned his office into the hands of Admiral de la Roncière le Noury, and presented him with a gold medal in commemoration of that day's proceedings. The Admiral then delivered an opening address, in which he dwelt upon the practical value of geography and its truly international character. He availed himself of this opportunity to assure the foreigners present that none could desire peace more ardently, nor stood in want of it so much, as France. The presidents of the foreign geographical societies then addressed the meeting in their native tongues, and thus imparted to it a truly international character. Baron Richthofen of Berlin, spoke first: he was followed by Sir Henry Rawlinson, M. Semenof (Russia), M. de Beaumont (Geneva), Signor Correnti (Rome), M. Hunfalvy (Pest), Dr. Schweinfurth (Cairo), and M. Veth (Amsterdam). Baron Reille then gave an account of the work performed by the Paris Committees of Organization. This inaugural meeting was honoured by the attendance of the Marshal-President of the Republic, and there were likewise present General de Baeyer, M. de Khanikof, Dr. Nachtigall, Dr. H. Kiepert, Colonel Montgomerie, Dr. Neumayer, M. Alfred Maury, Dr. Hamy, Dr. Rohlf's, M. Vivien de St. Martin, M. de Saucy de Saussure, Major Wilson, and others.

In the afternoon a banquet took place in a marquee erected on the terrace of the Tuileries Gardens.

* The "corral" or *enclôsure*.

It was presided over by M. de la Roncière le Noury, and toasts were drunk to France and Marshal MacMahon, to the Foreign Governments collectively, to the foreign Geographical Societies, and to the Commissaire Général. Baron Reille returned thanks in the name of the latter, Sir Henry Rawlinson on behalf of the societies.

On Monday, the 2nd of August, the real work of the Congress began. The seven scientific sections met on that day for the first time, and the results of their discussions were communicated to the general body of members at six general meetings held in the Salle des États, and presided over by the presidents of the leading foreign geographical societies. At the first of these meetings M. Semenov, of the Russian Geographical Society, took the chair. He was succeeded by Sir Henry Rawlinson, Baron Richthofen of Berlin, F. Von Hochstetter of Vienna, supported by Dr. Hunfalvy of Pest; M. de Beaumont of Geneva, and Signor Correnti of Rome, supported by M. Veth of Amsterdam. Amongst the subjects discussed at the sectional meetings, those of the centesimal division of the quadrant and of a first meridian were perhaps the most interesting. The centesimal division was recommended by the first group, after Struve, D'Abbadie, Champcourtois, Colonel Stubbendorf, and others had taken part in the discussion; but it was rejected by the second and sixth groups, the naval officers, in particular, being strongly opposed to any change of the existing system. The Congress at Antwerp had already decided in favour of a first meridian passing through Greenwich, but at Paris this question was again brought forward and referred to an international commission. An international system of conventional signs, to be used on charts, was submitted by M. Ploix, and recommended for adoption.

The fifth group discussed M. Roudaire's proposition to convert a portion of the Algerian Sahara into an inland sea, Colonel Bogdanovich's projected railway to Tashkend and Peking, and various plans for constructing a Central American ship canal. The sixth group employed itself with educational questions, and recommended that professorships of geography should be created in connection with the superior schools, and that the basis of geographical instruction in elementary schools should be topographical and not cosmographical. In other words, that a knowledge of the home district, and of the phenomena to be observed there, should precede a more extended knowledge and a generalization of facts. The desirability of such a system of instruction has been recognized long ago in Germany, where Vogel, Delitsch, Finger, and others have advocated it successfully, and "Heimathkunde" forms a regular subject of instruction in most schools. The meetings of the seventh group were perhaps most numerous attended, for they afforded an opportunity of becoming personally acquainted with several of the most successful explorers of recent times. G. Rohlf's, Dr. Schweinfurth, Dr. Nachtigall, Dr. Meyer, M. de Compigne M. Soleillet, M. Veniukof, M. Severtsof, Dr. Leitner, M. Léon Rousset, and others, rendered an account of their travels and explorations, without, however, stating anything absolutely new.

On the 4th, the Paris Geographical Society held their ordinary evening meeting, in spite of the Con-

gress, when many of the foreign visitors attended to listen to an interesting account of the observations of the Transit of Venus, by M. Janssen. But even this long array of meetings was insufficient to quench the thirst after geographical knowledge which brought so many geographers to Paris, in this one of the hottest Augusts on record, and almost daily there was afforded an opportunity of listening to one or two lectures on popular subjects. M. Rubinson explained his theory of aurora borealis; M. de Césac rendered an account of his voyage to the Cape Verde Islands; Dr. Nachtigall lectured on his travels in Africa; M. de Barante spoke on the physical geography and the resources of Russian Turkistan; Captain Roudaire on the Shotts of Algeria; M. Léouzon Le Duc on the condition of women in Ancient Scandinavia; M. d'Hennequin on geographical instruction in the Paris elementary schools; Dr. Meyer on his travels in New Guinea; M. Antonio de Gogorza on a proposed Central American Canal; and Lieutenant Delaporte on ancient monuments in Cambodia. On the 5th several hundred members of the Congress visited the Gallo-Roman museum of St. Germain, when M. Bertrand, in spite of a most refreshing rain, explained the use of catapults and other instruments of ancient warfare. On the 8th a visit was paid to the museum of Khmer (Cambodia), at Compiègne, where the members were entertained most hospitably by the town authorities.

To the majority of foreign visitors the geographical exhibition, in connection with the Congress, proved a greater source of attraction than the numerous scientific meetings, and though far from complete, it afforded a vast amount of instruction to those interested in geography. The collection was arranged according to countries, a classification according to subjects, which would have rendered reference far easier, being confined to the catalogue. There was no limitation as to the period of production of the articles exhibited, and it thus happened that works of no particular excellence, and which had already figured at other exhibitions, again made their appearance at the Tuileries, and very unfairly competed with more recent works for prizes. We are of opinion that an exhibition of this kind, if it is to be instructive in reality, should be divided into three sections. The first of these should be representative in character, and should include only objects of superior excellence in each department of geographical science, or such as illustrate the state of geographical knowledge in particular countries. These articles should be classified and arranged without reference to the country of production, so as to render comparison easy. Cadastral plans, topographical maps, charts, statistical maps, surveying instruments, &c., would thus constitute each a separate class, and the relative merits of each country or establishment would be shown in a more prominent manner, than by an arrangement which collects the most heterogeneous objects in the same room, and disperses those which offer some analogy, throughout an extensive building. The second section would include all objects forwarded for exhibition, the only limitation being that they must have been produced or published since the last International Congress. A third section might be arranged to illustrate the progress of geography and particularly of cartography. We trust that these sug-

gestions will be remembered when the time arrives for arranging the third geographical exhibition, which is to be held five years hence in London.

It is quite impossible, within the space at our command, to do justice to a collection as vast as that exhibited in the rooms of the southern wing of the Tuileries and on the terrace of the gardens. We shall therefore confine ourselves, on the present occasion, to a few general remarks.

Russia, which occupies the first place in the catalogue, likewise occupied one of the most prominent places in the exhibition, and nearly every geographical work published in that empire since the beginning of this century was to be found in the rooms allotted to it. In addition to published maps of all kinds—topographical, statistical, and ethnographical—there were numerous manuscript drawings, embodying the results of explorations not hitherto made public. The most important of these was a map of Northern Asia, on a scale of 1:4,200,000, which it is proposed to publish at an early date. Most of the articles exhibited have been produced at Government establishments, and they show that the Russian authorities pay every attention to the progress made in other countries and avail themselves of the best and most expeditious methods of producing their maps. The only private firm of importance represented was that of Colonel Ilyin, at St. Petersburg, which, though it cannot rival the productions of Perthes in Gotha, is nevertheless doing good service in spreading geographical tastes in Russia.

The sister kingdoms of Sweden and Norway exhibited the whole of their government publications, as well as a considerable number of private ones. The geological and statistical maps attracted a great amount of attention, as did also the plaster model of the huge meteorite found by Professor Nordenskiöld in Greenland. Denmark made a very creditable show. England was represented almost exclusively by public departments, for the British Government Commissioner had been appointed too late to enable private firms to prepare objects for exhibition. The maps, sketches, and other articles exhibited by the Trigonometrical and Topographical Survey of India, constituted the principal contents of one of the two rooms, and attracted the greatest amount of attention. The Ordnance Office exhibited several sheets of the survey of Scotland, which were deservedly admired. The Geological Survey had forwarded some huge portfolios, full of maps and diagrams. The Palestine Exploration Fund exhibited Major Wilson's model of Jerusalem. The Hydrographic Office of the Admiralty exhibited a selection of charts, the finest, by far, in the entire exhibition; and the Royal Geographical Society made a fine show with its publications, diagrams, and curious manuscript maps by celebrated travellers. There were likewise a few instruments by Captains George, Davis, and Bailey of the Royal Navy; but altogether the British department was far inferior to what it would have been had more time been available for preparation. The Netherlands were conspicuous by their meteorological apparatus, and amongst the maps, those of Java, which are beautifully printed in colours, attracted most attention. Germany made a fine show in spite of the policy of abstention pursued by the leading Government departments. The maps en-

graved at Perthes's Geographical Institute at Gotha, were amongst the very best exhibited, particularly so those of France, Spain, and the United States, which form part of the last edition of Stieler's Hand Atlas. Kiepert's wall maps for schools are deserving of attention, and altogether German publishers deserve credit for an intelligent spirit of enterprise which is not always met with in other countries.

The geological map of Saxony and Thuringia, published by the Berlin Geological Institute, on a scale of 1:25,000, should be noticed as the first map of that kind on so large a scale. Austria was most amply represented by the Military Geographical Institute at Vienna, but other government departments, as well as numerous private establishments, made likewise a most creditable show. We were particularly struck by a series of agricultural maps exhibited by the Cadastral Office of Vienna. The finest object in the Belgian department was Professor van Rysselberghe's "Meteorograph" or "Universal Registrar." The Italian room contained but little that was remarkable, though considerable progress has been made within the last few years, and the efforts made by Signor Cora, the editor of the *Cosmos*, and others, to spread geographical knowledge, are evidently beginning to bear fruit. Switzerland may fairly boast of having made some of the most valuable cartographic contributions to this exhibition. The fine map prepared under the supervision of General Dufour still stands unrivalled for beauty of delineation, and numerous private firms vie with the Government engravers in the beauty of the work they turn out. Spain had little to show, as yet, except the useful set of maps prepared by Senhor Coello, but a Topographical Survey is in progress, and the two first sheets of a map on a scale of 1:50,000 were exhibited. Portugal, though excluded from the catalogue, exhibited her Topographical Atlas as well as a geological map. Turkey exhibited several manuscript maps, including one of Yemen, and a lithographed map of Montenegro, copied from the Russian survey.

The only European country not yet noticed is France. To those who readily accepted the assertion that geography was a science not cultivated in that country, the very formidable show made must have proved a matter of surprise. The maps published by the Dépôt de la Guerre, and by other public departments, may fairly rank with similar works published in other countries, and the example thus set is not lost upon private publishers, amongst whom Messrs. Hachette occupy a prominent position for a spirit of liberal enterprise. A general atlas, now preparing for publication by that firm, from designs furnished by M. Vivien de St. Martin, promises to become one of the most precise works of that class. Amongst relief maps, that of France, by Madlle. Kleinhans, deserves to be mentioned, for it is one of the very finest in the exhibition. There are certainly in the French department many objects which ought not to have been exhibited, but taken as a whole, the French have no cause to be ashamed of the part they took in this exhibition.

Extra European countries were represented only in a few instances, and the United States, which might have made a very fair show, were confined to a small room, where their ill-arranged collection attracted but little attention.

A separate room was allotted to the Alpine Clubs, and some of the most valuable cartographic treasures of the Bibliothèque Nationale were exhibited in the Galerie Mazarine.

Some idea of the share taken by each country in the exhibition may be formed from the number of articles enumerated in the catalogue, which is as follows:—

France, 1579; Austro-Hungary, 581; Russia, 483; Netherlands, 335; Germany, 250; Switzerland, 231; Sweden, 229; Argentine Confederation, 159; England, 139; Belgium, 125; Denmark, 110; Norway, 100; Italy, 92; Spain, 62; Turkey, 48; United States, 29; Chili, 26; Japan, 13; Hawai, 8.

Seven international juries were charged with the distribution of the prizes. These juries were presided over by General Ricci, Admiral Acton (Italy), M. Semenof, Dr. H. Kiepert, Dr. Hunfalvy, Dr. von Becker, and M. de Khanikof. Each jury consisted of 19 members (4 French, 1 German, 1 English, 1 Austrian, 1 Belgian, 1 Danish, 1 Spanish, 1 Dutch, 1 Italian, 1 Norwegian, 1 Russian, 1 Swedish, 1 Swiss, 1 Turkish, 1 Argentine, and 1 American); and there were in addition 1 Reporter, 1 Secretary, and 1 Commissioner. Several of the members served on more than one jury (England, for instance, had only two representatives, Colonel Montgomerie and Major Wilson), and as the meetings generally took place simultaneously their votes were thus lost, on critical occasions, to their clients. We feel sure that the decisions arrived at by these juries will not, in many cases, meet with the approval of geographers, and although the number of prizes awarded is exceedingly large, several exhibitors of merit have been passed over in favour of others to whom no distinction was due. This is felt even more by French exhibitors, with whom we have conversed on the subject, than by foreigners. We have likewise heard objections as regards the large number of prizes awarded to publishers and government departments in preference to conferring distinction upon the authors of the works exhibited. We propose, in our next number, to give an analysis of the whole of the prizes awarded. For the present we confine ourselves to mentioning the English prize-takers, as well as those government departments, firms, and private persons, who received letters of distinction. Of the latter no less than eighty were awarded, viz., to—

Topographical and Geodetical Departments (Depôts de la Guerre, &c.):—France, Russia, Sweden, Norway (2), Denmark, England, India, Netherlands, Java, Austria, Belgium, Italy, Switzerland (2), Spain, Turkey (1), Portugal.

Hydrographic Offices:—France, Russia, England, Netherlands, Spain, United States.

Geological Survey Offices:—France, Sweden, Norway, Prussia, England, Austria, Switzerland.

Meteorological Departments:—Russia (Physical Observatory), England, United States (Signal Service).

Statistical Departments:—Austria, Hungary.

Public Libraries:—St. Petersburg, Brussels.

Observatories:—Pulkova.

Other Government Departments:—France (Dépôt of Fortifications and Ministry of Public Education), Educational Museum of St. Petersburg, Colonial College at the Hague, Hawai (1).

Geographical Societies:—Russia (2), London, Rome.

Academies:—Venice, Madrid.

Alpine Clubs:—French, Austro-German, Swiss, Italian, London, Carpathian, Tatra, Styrian, &c.

Palestine Exploration Fund.

Public Companies:—Suez Canal Company, St. Gotthard Tunnel Company, Great Northern Telegraph Company.

Publishers:—Kühne, of St. Petersburg; Messrs. Hachette, of Paris; M. J. Perthes, of Gotha; M. D. Reimer, of Berlin.

Private Individuals:—M. de Quatrefages (for works on anthropology), General Kaufmann (exploration of Turkistan), Admiral Lütke (voyage of the 'Seniavin,' 1826-29), Professor Nordenskiöld, Messrs. Torrel and Von Otter, jointly (Arctic explorations), Archduke Louis Salvator of Austria (work on the Balearic Isles), Professor Von Rysseberghe (meteorograph), M. Mülhaupt of Bern (engraver).

France received 12 letters of distinction; Russia, 11; Austria, 10; England, 8; Switzerland, 6; Italy, 5; Germany, Sweden, and the Netherlands, 4 each.

In addition to the above, the following British exhibitors received medals or were honourably mentioned, viz.:—

1st Class Medals:—Members of 'Challenger' Expedition, Geological Survey of India, Staff-Commander George (double sextant and barometer).

2nd Class Medals:—General Sir Henry James, the late A. Findlay, Mr. J. Thomson (Chinese photographs).

Honorably Mentioned:—Mr. Henry Hennessey (author of geodetical tables), Captain Evans, Captain Richard Mayne, Captain J. E. Davis (sextant), Colonel Gordon, Captain Chapman (of Forsyth's Expedition), Major Herbert Wood (Oxus Expedition), and Lieutenant Collingwood.

The executive commission awarded additional letters of distinction to the museum of Khmer, at Compiegne, and to MM. Payer and Weyprecht.

The final meeting of the Congress took place on the 11th of August, under the presidency of M. Wallon, the Minister of Public Education, and was honoured by the presence of Marshal MacMahon, of the Grand Duke Constantine of Russia, and of many other persons of distinction. M. Wallon delivered an address on the results of the Congress; M. Maunoir, the Secretary of the Paris Geographical Society, made a statement of the work performed by the Executive Commission, and the venerable Commandatore Negri returned thanks on behalf of the foreign associates, for the hospitable manner in which they had been received. The presidents of the various sections then announced the names of the exhibitors to whom prizes have been awarded, and the proceedings terminated.

Our account of this Congress would not be complete without a reference to the receptions held at the mansions of Marshal MacMahon, M. Wallon, and the Prefect of the Seine, invitations to which were extended to all the members of the Congress without distinction.

E. G. RAVENSTEIN.

THE VOYAGE OF THE 'CHALLENGER.'

VII.

In a former number (October 1874) the section of the exploring voyage of H.M.S. 'Challenger,' comprised between the Cape of Good Hope, towards the Antarctic regions and Australia, was completed, and in the number for February 1875, some additional notes on that section were added.

On the 17th of March the 'Challenger' anchored in Melbourne, and remained there a fortnight. Leaving on the 1st of April, she passed through Bass Strait, close to the northward of Rodondo and Monceur Islands, reaching Sydney, New South Wales, on the 6th, to refit. The ship was docked, refitted, and completed with coal and provisions previous to continuing her voyage. The officers and crew fully enjoyed their sojourn in that magnificent harbour,

and the hospitality they received was unbounded, but science was not neglected during their two months' stay in Port Jackson. During that time, Professor Wyville Thomson made a journey to Queensland for the purpose of studying the natural history of tropical Australia.

The next part of the proceedings of the 'Challenger' was one of great interest, both to the colony of New South Wales and New Zealand, for a line of soundings was to be taken between the two countries to ascertain the fitness of the ocean bed for connecting them by means of a telegraphic cable. The 'Challenger' sailed on the 8th of June, but was met by a gale sufficiently strong to prevent any work being undertaken and she was obliged to return to port, from which a second and final start was made on the 12th. Still the weather was unfavourable for sounding, and still more unfavourable for dredging. The few hauls that were taken on the passage across proved that animal life was scarcer than is usually found at the sea bottom, but some good specimens were obtained, an entirely new species of sea-egg being noticeable. From the Australian coast the water gradually deepened to 950 fathoms, it then more suddenly deepened to 2100 fathoms at a distance of 55 miles from the land, but the weather was so stormy that the line parted in heaving in. No soundings were obtained on the 15th, on account of a fresh gale springing up from the S.S.W. During the night the spurs of the cutter's davits were struck by a sea, and the cutter thrown up into the mizen rigging.

On the morning of the 16th, after steaming in towards the land, a sounding was obtained in 2500 fathoms; but the line again parted, this time in consequence of a flaw in it. Serial temperatures were obtained to 1500 fathoms. Proceeding on her course against a head wind and sea, soundings were taken on the 17th in 2600 fathoms at a distance of 240 miles from the Australian shore; the temperature at the bottom being 33°. On the 19th, at a distance of 140 miles from the last sounding, the same depth with the same bottom temperature was obtained. Serial temperatures were taken to 1500 fathoms, and specimens of water obtained to a depth of 400 fathoms. In these two last soundings the bottom consisted of the red clay of the deeper waters, whilst on either side the usual globigerina ooze was found. This deep trough between the two lands is about one-fourth the distance from the Australian shore.

Early in the morning of the 21st, a sounding was made in 1975 fathoms, and serial temperatures obtained. The wind freshened to a gale at night, and the fore-topmast staysail stay carried away, the sail being with difficulty saved. At 1 o'clock on the 22nd, soundings were obtained in 1100 fathoms, with a bottom temperature of 35°·7; serial temperatures were taken, and early the next morning a sudden shoaling of water was found, the depth being 275 fathoms, with hard bottom. Two more soundings the same day gave 350 and 400 fathoms, the bottom of the last sounding being clay. Early the following morning 400 fathoms were found, and three hours after 150 fathoms. Just before noon Mount Egmont was seen.

On the morning of the 25th a course was steered for D'Urville Island, and at 5 p.m. the 'Challenger' anchored in Port Hardy. The next day a strong

south-east gale, accompanied by a heavy sea, rendered it advisable to remain in port; but on the morning of the 27th, still blowing hard, the ship steamed out, making but little way against the heavy sea. As there was no chance of reaching Port Nicholson before night, anchor was cast in Queen Charlotte Sound, near Long Island. Next morning the 'Challenger' again put to sea, but the wind being against the current, it caused a nasty sea. Soon after noon a sad accident occurred which created a feeling of gloom throughout the ship. A seaman gunner had just taken his place in the chains as leadsmen, when the line fouled the anchor-stock, and in attempting to clear it a heavy sea struck the vessel on the lee bow, which threw her over to windward. When she righted the poor leadsmen was missed. He was supposed to have sunk immediately, as he was not again seen, although the ship was immediately hove-to and men from all parts of her on the look-out for him. The man, Edward Winton, was greatly respected, and his loss was, therefore, much felt by all.

At 4 P.M. the Heads were passed, and at 5 P.M. the 'Challenger' anchored in Port Nicholson.

After a stay of a week at Wellington, during which period the weather was anything but what could be wished, reminding the voyagers more of Kerguelen Land than was at all desirable, the 'Challenger' weighed anchor on the 6th July and under steam proceeded out of the port; but as the weather became thick, with a strong north-west wind and squalls, it was impossible to proceed; the ship was therefore brought up in Worsler Bay for the night, and at 6 the next morning she succeeded in clearing the Heads and stood to the northward under sail.

On the morning of the 8th steam was got up and a sounding obtained in 1100 fathoms, with soft green mud bottom, in lat. 40° 13' S., long. 177° 43' E., temperature 35°·6. The same afternoon the trawl was put over and a number of specimens of holothurixæ, shrimps, worms, &c., secured. Continuing along the east coast to the northward, at daylight on the 9th, the Mahia Peninsula was sighted, and on the 10th they sounded in 700 fathoms and obtained serial temperatures. Leaving the New Zealand coast they proceeded north towards the Kermadec Islands, but the nature of the weather prevented sounding operations. At 10 P.M. on the 12th Macaulay Island, of that group, was seen; the course was then altered for a position between Macaulay and Raoul Islands, and at 7 on the following morning a depth of 520 fathoms was found. The trawl was put over and different species of sponges, star-fishes, &c., obtained, and the general resemblance between the animal forms brought up from about the same depths off the coasts of Portugal and Africa was noticed. The following morning, the 14th, another haul was had in 600 fathoms, north of Raoul Island, which proved equally prolific, and as three or four specimens new to science were discovered, the naturalists were satisfied. The bottom was composed of lava pebbles and pumice, and although more than usually dangerous to the trawl, they succeeded in working it without accident. Raoul, or Sunday Island, was discovered in 1793 by Admiral D'Entrecasteaux: it is triangular in form, about five miles long east and west, and four miles broad. It is high and rugged, three of the peaks rising to about 1600 feet above the sea, the precipi-

tous sides being covered with wood. Captain Denham visited this island in 1854, at which time only one family lived on it.

Macaulay Island is a small, round island, about three miles in circumference; it is very steep, and rises to a height of 750 feet.

On the 17th, in lat. $25^{\circ} 5' S.$, long. $172^{\circ} 56' E.$, a depth of 2900 fathoms was found (the deepest since leaving the Atlantic), with a red clay bottom, the temperature at that depth being $32^{\circ} 9$, this temperature proving that there is a continuous deep channel from the Antarctic seas.

On the morning of the 19th, they hove-to off the island of Eooa to await daylight, and at 7 o'clock Tongatábu was seen right ahead, Euaigie Island being on the starboard bow, and in the evening the 'Challenger' anchored off the king's residence at Nukalofa.

Tongatábu group is the principal and most southern of the Tonga or Friendly Islands, and derives its name from the largest island. The island of Eooa lies to the south-east, 9 miles from Tongatábu, and although the smaller island rises to a height of 600 feet, the larger, Tongatábu, is flat, the highest point, on which the church now stands, being only 60 feet high; a few other hillocks of 30 or 40 feet may be seen.

Tongatábu Island is 23 miles long east and west, and about 8 broad, and in the form of a crescent, bearing its convex side to the south, while coral reefs extend 6 to 8 miles off the concave side, and form numerous channels leading towards the harbour. There are but two of these channels navigable for ships, one to the east, the other to the north, through which vessels thread their way by observing from the mast-head, the discolouration of the water caused by the coral reefs. A lagoon about 3 miles deep, into which there is only a passage for a canoe, lies 4 miles east of the town of Nukalofa. It leads up to the town of Bea, which may be termed the stronghold of heathenism on the island, the natives retaining much of their original characteristics.

The soil of the island is rich and very fertile; the luxuriance of the foliage can scarcely be surpassed. In some parts of the island the soil consists of a blackish mould, which emits an agreeable odour of bergamot, but it quickly evaporates in the air.* The population is estimated at 5000, of which about one-fifth are Christians; supplies of food may be obtained, but the great want is fresh water, there being no streams on the island, water being only procurable by digging, and such as is obtained by that means is not good.

The Friendly Islands form an independent state, and now have a national flag. The king (George) was residing at Nukalofa. He is a hale old man of about seventy-five, with a pleasing expression of countenance, the face being fringed round with white whiskers and beard. The queen was not so prepossessing: she is very stout, and seemed conscious of her dignity in her European dress, her head being surrounded by gipsy hat and feather, after the most violent type of servant-gal-ism. Young as the country is, the people understand direct taxation, a poll-tax of seven dollars being levied on each adult, whilst a most effectual bar to drunkenness is effected by the excise, in a licence duty of 100%, levied on spirituous liquors of any kind, and a customs duty of two dollars per

* Findlay.

gallon on spirits, one dollar on wine and a shilling on each bottle of beer. There are consequently no public-houses; moreover every sailor is required by the law to be on board his ship by eight o'clock in the evening.

No sooner had the 'Challenger' anchored than she was surrounded with canoes, containing a great number of natives, who soon found their way on board; and a fine race of men they were—tall, robust, with intellectual features, and singularly good looking; the women being decidedly handsome and very fair, might easily be mistaken for half-castes; but notwithstanding their superiority in form and intellect to the races found on other islands, they are equally indolent, for very little labour being required to produce almost any crop, they are too lazy to cultivate as the islands abound with cocoa-nuts, bananas, oranges, yams, &c. which grow almost spontaneously.

The usual dress of the natives is much the same for the males as for the females, viz., a roll of "tapa" wrapped round the loins; but the influence of the missionaries has caused this revolution in dress, that they must appear more decent in company, and a fine of a dollar is imposed on a man that ventures to put his foot on board a ship without having a regular shirt on. The women are not permitted to visit ships at all. Some of the natives have adopted the European dress, and wear it with much pride; the women, as is natural, are fond of gay-coloured dresses, &c. The manufacture of the tapa from the bark of a tree is discouraged as much as possible in order to induce the natives to cultivate the cotton-plant, which thrives wonderfully on the luxuriant soil of the island.

About forty white people are resident at Nukalofa, and as is unfortunately the case in too many places, the missionary labours are divided by two very different sects, the Wesleyan and the Roman Catholic.

The village or town of Nukalofa is prettily situated in a bread-fruit and cocoa-nut grove. The church is the most conspicuous building on the island, as it is situated upon its highest hill. It is a neat-looking building, divided into three aisles by two rows of columns that support the frame-work of the roof, which is thatched with the leaves of the sugar-cane. Near the church door is a monument erected to the memory of Commander W. Croker, who was killed in an unsuccessful attack on the village of Bea in 1840. The church is capable of holding from 700 to 800, and on the Sunday was well attended. A native preached, and the singing, accompanied by a tolerably good organ, was sweet and in excellent time. So far back as 1797, the London Missionary Society sent missionaries to this island, but the warlike nature of the inhabitants caused them to quit the field, and a quarter of a century later, the Wesleyans commenced their labours, and their efforts have been eminently successful; most of the natives having embraced Christianity, and schools have been established.

On the morning of the 22nd of July the Expedition left Tongatábu and after taking a few hauls of the dredge in shallow water, proceeded towards Fiji. On the 24th they stopped off Matakú Island to land a party of surveyors and naturalists, and during the time they were on the island the ship trawled in 300 fathoms water. Among other treasures obtained was a fine specimen of the pearly nautilus, *Nautilus pompilius*,

which was kept alive in a tub for some time in order to observe its movements.

Mataku is the southernmost and perhaps the most beautiful of the Fiji Islands. It was discovered by the French navigator D'Urville. Its face is broken into volcanic peaks, the highest reaching 1260 feet above the sea level; it is $4\frac{1}{2}$ miles long and from 1 to $3\frac{1}{2}$ broad, and fringed by a coral reef nearly a wash, through which, on the western side, is a channel, with 30 fathoms water, leading into a fine basin.

Pigs and poultry, with wood, water, and vegetables, can be procured. The naturalists were very successful in their researches through the island, as many birds of brilliant plumage were shot, and a rich harvest of botanical specimens secured.

The following day the 'Challenger' arrived at Kandavu Island, anchoring in Ngaloa Bay, and as this had been selected as the port of call for the mail steamers between Australia, New Zealand, and San Francisco, a few days were spent in surveying the anchorage. The idea of this route, however, has since been abandoned.

Kandavu is the south-westernmost of the Fiji Archipelago, and was discovered by D'Urville in 1827: it is 25 miles long, and is high, excepting a small part at its centre. At the west end is the conical peak of Kandavu, about 2000 feet high: it is very much truncated at the summit, the sides descending in a straight inclination to the sea. The island is beautiful and well covered with pine timber, much resembling the New Zealand kauri pine, from which most of the large canoes used by the Fijians are built. The island is much used as a port of call to the whalers of the South Seas, as abundance of provisions are to be obtained.

After a stay of two days at Ngaloa, the 'Challenger' proceeded to Levuka, Ovalau Island, and found here a barque laden with coal awaiting her arrival. Previous to this, intelligence had reached the place that a large French man-of-war steamer was on shore on the reefs of Wallis Island, and H.M.S. 'Dido' immediately left to her assistance, but on reaching the island found the ship a total wreck. Assistance was offered and declined, as part of the crew had been sent in a German vessel to New Caledonia, and it was expected that one of their own ships would come to their relief.

Ovalau is a high, small, and almost circular island, being 8 miles long by 7 broad; the loftiest peak is nearly 2090 feet high. It is of volcanic formation. The valleys extend but a short distance inland, but they are well cultivated: Levuka harbour is on the east side and is well protected by reefs and easy of access. The town is situated in a valley and surrounded by a dense grove of bread-fruit and cocoa-nut trees, and has a fine stream of water running through it to the beach.

The 'Challenger' left Levuka on the 3rd of August, returning to Ngaloa, where she remained until the 10th.

Previous to leaving the Fiji group, a party of labouring men, natives, who had completed their engagements in Australia, were embarked for a passage to their home in Api, one of the New Hebrides group, and reported to be one of the most savage of that savage group. The men were quiet and inoffensive, and greatly enjoyed their improved diet on board the ship. While on board they exhibited their treasures,

the result of four years' labour, which were considered to be worth less than 5% at Australian prices, the hatchets and knives having been "made for sale!" Notwithstanding the apparent hardships of their servitude they were well content, and their influence on their countrymen, after working for and with the white men, must be considerable. On reaching Api, they appeared much alarmed lest they could not be landed on their own particular part of the coast, but it was not without some difficulty that they were landed at all.

About midway between the Fiji Islands and New Hebrides, the depth was 1450 fathoms, with a red clay bottom. When about 30 miles from Kandavu a sounding was obtained in 1350 fathoms, and in trawling, the trawl fouled something at the bottom which gave much trouble in clearing, but nothing of interest was obtained. The tangles brought up a branch of wood two feet long.

On the 17th the Expedition passed through the New Hebrides group between the islands of Makura and Two-hills, finding a clear passage between them, and, without anchoring, proceeded on her way towards Torres Strait. On the 19th they sounded in 2650 fathoms, red clay. The serial temperature soundings at this and the other sounding stations as far as Raine Island, show that the temperature at the bottom, instead of being 33° is 35°, which is the same as at 1300 fathoms, and proves that below that depth this sea is cut off by a surrounding ridge, over which the greatest depth of water of any channel through it is 1300 fathoms. As this depth is about that found between New Hebrides and Fiji Islands, it may be taken for granted that from Sandy Cape in Australia to New Caledonia, New Hebrides, Solomon Islands, and New Guinea there is a bank with not more than that depth of water. Below this depth, in the hollow between New Hebrides and Torres Strait, the water is comparatively stagnant, as in the Mediterranean and other cut-off seas.*

Between the 19th and 27th August, in a run of 1000 miles, four soundings were taken at depths exceeding 2200 fathoms, the temperature of the bottom remaining the same. On the 28th, when 170 miles from Raine Island, the depth was 1700 fathoms, and at a distance of 74 miles from it 1400 fathoms, showing that the inclination of the bottom of the sea is gradual towards the Barrier Reef.

The 'Challenger' entered the Great Barrier Reef of East Australia through the Raine Island Passage on the 30th, and anchored for the night near Raine Island. On the following morning a visit was paid to the island, which is of coral formation, about one-third of a mile long and a quarter of a mile broad, and only about 20 feet above the level of low water. The passage was much used in former times, and as many vessels were wrecked upon the numerous coral reefs, Captain F. P. Blackwood, in 1844, built a circular tower or beacon 64 feet high, of stone hewn on the island. It consisted of a series of chambers one above the other, and was furnished with a store of provisions and a tank of water. It was painted in red and black vertical stripes, and from a ship's masthead

* These and other facts connected with the soundings and temperatures are derived from the "Reports of Her Majesty's Ship 'Challenger.'"

could, in clear weather, be seen from a distance of 12 or 13 miles.

The stone-work of the beacon was found by Captain Nares in good order; the woodwork, however, had long since decayed, but in falling had not injured the masonry; indeed the building did great credit to the sailor architects. No supplies were found, and the iron water tank had nearly rusted away. The sea birds were in clouds, and so dense a mass did they form when hovering overhead that the darkness created by them was apparent. The nests covered the ground so thickly that it was difficult to walk without treading on them. New-laid eggs were found in the nests of some of the tern, and young birds in all stages of growth in others; and, as was said of the penguins of Nightingale Island, of the Tristan da Cunha group, had the birds of Raine Island been aware of the advantage of combination, they could well have withstood the landing of the strangers.

The Expedition arrived at Somerset, Cape York, on the evening of the 1st September.

J. E. DAVIS.

Reviews.

THE ABODE OF SNOW.*

THE advantage of having before us, comprised within the compass of an octavo volume, such interesting and really valuable notes as these, will be sufficient excuse for reviewing at somewhat greater length than is our wont, a work, a great part of which has already appeared in a monthly magazine. Mr. Andrew Wilson happily ranks above the general run of English travellers in regard to his freedom from prejudice, and at a time when the national interest in Indian affairs is perceptibly and surely increasing, it is a matter of some significance to find that the deliberate opinions of an intelligent outsider, though tempered now and then with no sparing criticism, do in the main support the general policy of our Government in India. Some of his early observations form the greatest imaginable contrast to the spurious and grotesque philanthropy which a long estrangement from, or a total ignorance of, India appears so inevitably to breed in our home press writers. Speaking of the employment of natives in offices of responsibility, of which we have heard and still hear much, he remarks that the result has been to push forward a class of natives who exercise no influence over the people, are entirely mistrusted by them, and who cannot but regard us with hatred. But this observation is one made *en passant*, the theme being a question of still greater moment, and one of which of late years has become a matter of real urgency—we mean the question of the poor whites and Eurasians. Of these, he says, "They form a large and ever-increasing class of poor whites and half-castes who are a scandal to the Christian name and the white race, having been forced by circumstances to depths of misery and depravity unknown among the jungle tribes; and hence the painful fact that the large towns of India contain a number of respectable, fairly educated English and Eurasian people who are at their wits' end how to live."

This picture should wake an active anxiety in the breasts of rulers, and though perhaps few may care to endorse the extreme opinion quoted by the author, that

the next rebellion in India would be on the part of the Europeans and Eurasians, and that every soldier who had been six months in the country would be on their side, it should nevertheless be recognized that the growth of this class will become powerful for evil as well as good, but that careful legislation might discover herein the germ of a future population, which, by its familiarity with the people and climate, not to speak of stronger ties in the case of the half-castes, would forge an adamant link between the colony and its mother country.

A pleasant chapter is that devoted to Simla and its society—the Capua of India as some term it. This appellation, however, the author does not see the justice of. He points out with truth that Simla having no open law courts to speak of, no shipping, mercantile, or other business which affords matter for the newspapers, and that the important affairs of Government being seldom immediately made known, the correspondents have little to write about except the balls, picnics, croquet, and badminton parties, flirtations and rumoured engagements, all of which assume exaggerated importance in the eyes of those who discuss them. But Simla is no Castle of Indolence—

"Most of the English in India, be they civilians, staff officers, educationalists, surgeons, merchants, missionaries, or editors, are compelled to live very laborious days whether they may scorn delights or not. . . . To compel the Supreme Government to remain nearly all the year in the unhealthy delta of the Ganges would be to burden it with a good deal more than the straw which breaks the camel's back."

We must, however, not forget that this book is essentially one of travel. The author had a great wish to visit some of the hill stations of the Himalayas, but on reaching these the glimpses caught of distant peaks appears to have had an irresistible fascination, and he accordingly proceeded to make preparations for a somewhat lengthy excursion in these grandest of all mountainous regions. His first journey lay along the famous Hindustan and Tibet road—a highway which though constructed at great expense has unfortunately entirely failed in its object of serving to attract the through trade between Tibet and India. The road, though fallen into disuse, is favourably compared by the author to the native paths of the Inner Himalayas, but the terrible accidents which have occurred (principally to equestrians) at various points along it, prove that those who traverse it need the utmost nerve. At Pangay the road comes to an end, and the author then ascended the valley of the Sutlej to Pu, where a severe attack of dysentery prostrated him for three weeks. Happily Pu is the residence of a Moravian missionary, and from his wife Mr. Wilson was enabled to procure medicines. But the visitors who frequented the vicinity of his tent appear to have helped to keep him in a state of uneasiness; at one time it was a bevy of Tartar Pilgrims who kept up a howling through the whole of a weary night; at another time he was awakened by a Tibetan mastiff fumbling at his throat to see if it was cold enough for his purposes, while on another occasion a formidable specimen of the *ursus isabellinus*, or snow-bear, was discovered making a supper off an apricot tree within sight of the author's bed. However, Mr. Wilson eventually recovered, and after surmounting the Kungma Pass (16,000 feet), Chinese Tibet was eventually reached at Shipki, the frontier town on which devolves the duty of turning back travellers. The absurd difficulties which delayed the pitching of the tents, the good-humoured hostility of the Tartar women in their jack boots, and the unsuccessful efforts made by the author to penetrate further into Tibet, are all well worth reading. We cannot help thinking that he goes somewhat out of his way to find a cause for the exclusion of strangers in the possibility of Tibetan gold attracting the cupidity of lawless English and Americans. The arguments of the Shipki people, when interrogated by the author's companion, was that England having once got a

* *The Abode of Snow*. Observations on a Journey from Chinese Tibet to the Indian Caucasus through the upper valleys of the Himalaya. By Andrew Wilson. London (Blackwood), 1875.

pied-à-terre for commerce always finished up with annexation. This argument tallies exactly with that made use of a century ago by the Teshu Lama on the occasion of Mr. Bogle's mission to him. It appears to us a very sufficient reason for the fears of the Chinese Tibetan, though those who know more of our modern policy may see its groundlessness.

From Shipki Mr. Wilson's route was an extremely interesting one, traversing as it did the line of the Western Himalaya, in the interior of its ranges, at an average height of 12,000 feet, through the provinces of Hangrang, Spiti, Lahaul, Zanskar, Sum and Dras. Some of these regions are very little known, the district of Zanskar in particular claiming attention on account of the extraordinarily fantastic appearance of its precipitous mountains, the complexity of its geological systems, and, above all, the apparently close, though startling, connection between its people and the Scottish Highlanders. The author's route from thence into Kashmir lay across the Omba Pass, the height of which is about 14,500 feet, and the difficulties of which are graphically described. His remarks on Kashmir, its inhabitants, its ruler, and its regulations for the entertainment of European visitors are amusingly criticized.

We have not space to follow the author in any detail in his journey *via* the military station of Abbotabad to the British frontier at Torbela, in his excursion thence across the Indus into the fighting city of Kubbul, a nest of red-handed criminals, in most cases fugitives from English justice, and, lastly, in his journey to the Khyber Pass. We feel confident, however, that the reader who has got so far will not omit even a portion of the narrative before him, for Mr. Wilson's book is emphatically one of those which once commenced carries the reader along irresistibly to its very last page.

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DAS DEUTSCHE REICH IN GEOGRAPHISCHER, STATISTISCHER UND TOPOGRAPHISCHER BEZIEHUNG, Von *Gustav Neumann*. Zweite Auflage der "Geographie des Preussischen Staates," Berlin, 1875, Otto Müller, 2 vols. in 4. 8vo.

THIS is a new edition of the author's *Geographie des Preussischen Staates*, which the altered circumstances of the German Empire has rendered necessary. It now embraces, as the title expresses, the whole of the German Empire. As a topography of the Empire, it is the most perfect work yet published, always reliable in what it states, even though occasionally defective in minor details. Its statistics, too, are no less carefully brought together, and consequently, it is very popular in Germany, one of its elements of that popularity being its issue in twenty-five cheap numbers, and in four half volumes.

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DIE INSELN DES STILLEN OCEANS, EINE GEOGRAPHISCHE MONOGRAPHIE. Von *Dr. C. E. Meinicke*. 1 Theil. Leipzig (P. Froberg). London (Trübner & Co.).

DR. MEINICKE is a great authority on Australia and the islands of the Pacific, to which he has devoted his attention during the last fifty years. The first volume of his latest work on this subject is now before us. It is a most careful compilation, and may be consulted with confidence, for the researches of travellers of all nations have been embodied in it. A chapter on the islands of the Pacific and their inhabitants in general, is succeeded by detailed accounts of Melanesia (including New Guinea) and New Zealand. A second volume will treat on Polynesia. Dr. Meinicke has been careful to give the native names, wherever they have been ascertained, as well as the nomenclature of European navigators. There is no map, but we trust one will be published with the second volume.

VOL. II.

Log Book.

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The Arctic Expedition.—H. M. S. 'Valorous' arrived at Plymouth on the 29th August, with news of the progress of the Arctic Expedition up to July 17th, when the 'Alert' and 'Discovery' were last seen sailing down the Waigat. They will have reached Upernivik on or about the 20th, and are now, we trust, at or near the base of their operations in winter quarters. In our next number we shall give a complete account of the expedition and of its prospects, as well as a narrative of the perilous and important return voyage of H. M. S. 'Valorous.'

Archæological Survey of Southern India.—The valuable archæological researches of General Cunningham in the north, and of Mr. Burgess in the west of India, are now likely to be supplemented by the organization of an archæological survey of the southern portion of the peninsula. It is unnecessary to do more than allude to the great importance of such an examination of the numerous records and monuments of the Dravidian provinces, and to the flood of light which would thereby be shed on the customs, languages, and history of the inhabitants. The importance of the project, which was warmly supported at the recent Oriental Congress, has been fully recognized by the Secretary of State for India, and he has now commended the whole subject to the Government of India for early consideration.

Connection between variation of Solar Spots and other Meteorological Phenomena.

—Mr. H. F. Blanford, meteorological reporter to the Government of India, has recently read a paper before the Asiatic Society of Bengal, in which he contends for the truth of certain old speculations that the sun's heat varies from year to year to such an extent as appreciably to affect terrestrial phenomena. Registers of the readings of a maximum black bulb thermometer were commenced at a few stations in Bengal in 1867 or 1868, and at others observations were begun in subsequent years. It was found necessary to eliminate as far as possible from the individual registers the irregularities due to variations in the state of the sky, and this can be done but very imperfectly. From actinometric observations instituted by various scientific men, it results that with a vertical sun and a sky free from all visible cloud or haze, the proportion of solar heat that penetrates the whole thickness of the atmosphere does not amount to more than two-thirds or three-fourths of that which reaches the exterior of our atmosphere. But in India, on cloudless days, the atmosphere is not nearly so diathermanous, and it is probable that not less than half the solar radiation is absorbed by it. From a consideration of the observations taken when the sky was either cloudless or nearly so, at 10 A.M. and 4 P.M., together with the two highest readings recorded in each month, Mr. Blanford has obtained results which agree in showing a very decided variation of the incident solar heat, a variation which approximately in the epoch of its maximum, its rapid rise before that maximum and slower decline after it, agrees with the variation curve of the solar spots. The importance of this discovery lies in the fact that if the sun's radiation vary directly with the number of spots and prominences every other meteorological phenomenon must likewise so vary, rainfall and temperature included. With regard to rainfall, the coincidence of its variation with that of the sun spots has been only partially verified by the data, but seeing that the rainfall of the larger part of the world has not been taken into consideration, this is no more than we should expect. A vast train of enquiry is opened up by the fact, if once established, that the solar heat undergoes periodical variation, and

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although it now appears improbable that any steps will be taken to establish a solar observatory at Simla, such as was recently talked of, yet their importance affords a strong incentive for the institution of continuous observations of solar phenomena in tropical countries so well adapted for the purpose as India.

The Eucalyptus Globulus.—M. Cosson has communicated to the Paris Geographical Society a note on the subject of the *Eucalyptus globulus* (or blue gum tree, as it is termed in Australia) and the success which has attended its acclimatization in other countries. Although discovered in 1791, it was not till 1854 that it was known beyond the precincts of botanic gardens. M. Ramel, who happened to see some fine specimens in the Melbourne Gardens, was much struck with them, and ascertained from Baron de Müller, the director, that the tree was an excellent fever-dispelling agent, was easily acclimatized, rapid of growth, and afforded capital timber for shipbuilding. Chiefly through the help of the Acclimatization Society and the Museum of Natural History at Paris and the Experimental Gardens in Algiers, the tree has been successfully introduced into Southern France, Corsica, Algeria, Spain, Portugal, Egypt, Senegal, Madagascar, Reunion, the Cape, Guiana, Guadeloupe, Tahiti, India, New Caledonia, and other places. In Algeria the experiment has proved most successful. At Ain-Mokra, on the banks of Lake Fezzara, the few inhabitants were almost decimated by marsh fevers, and the rich iron mines of Mokta adjoining were in consequence abandoned in summer; some hundreds of trees planted on the shores of the lake have rendered the place quite healthy, and enabled the mines to be worked. It has also been ascertained that an infusion made from the leaves, as well as the leaves powdered, the extract and essential oil are all valuable therapeutics.

Exploration in Iceland.—Mr. W. L. Watts, author of *Iceland: its Fjokulls and Fjalls*, has successfully, though not without fatigue, accomplished the task he announced his intention of setting himself, *i.e.*, that of exploring Vatna Yökull, a mountain covered with snow and ice in the south-east of the island. Last year Mr. Watts had ascended the Vatna to the height of 6000 feet, and this year he has completed his examination of it and of the volcanoes to the north of it, in eighteen days. He has satisfied himself that the Vatna is the highest mountain in Iceland, and appears to incline to the belief that volcanic action is increasing to the extent of the ice-covered mountains of Iceland, and that a gradual assimilation to the orography and physical geography of Greenland will thus take place.

The Amazons Valley.—In April last Don Rafael Reyes, a New Granadian, arrived at Manáos (the capital of the Brazilian province of the Amazons) from Popagan, by way of the River Içá, on which he hopes to start steam navigation. He reports the Içá free from rapids and with a sandy bed; it is, however, somewhat shallow in the dry season, so that vessels should not draw more than 4 feet of water. Don Rafael's "port of embarkation" on the Içá is stated to be only 25 leagues from Popagan, which seems almost impossibly short; perhaps it should be from Pasto.

In April also Captain Andrea started from Manáos up the river Purús, bound for its affluent the Aquiri, from which he purposes to open a road to Bolivia. Captain Andrea takes with him a well-armed party to resist Indian attacks, and from what is known of him it is believed he will use every effort to succeed in his difficult enterprise. By *Bolivia* is probably meant the Bolivian settlements on the river Mamoré (as the Aquiri itself, south of lat. 10° 20' S., must be in Bolivia): but to reach these the great river Beni has to be crossed.

Obituary.—COMMODORE J. G. GOODENOUGH, C.B., C.M.G. We regret to have to record the death

of this able and gallant naval officer, who was treacherously murdered while endeavouring to open friendly intercourse with the natives of Santa Cruz Island, one of the Solomon Group. We have had occasion more than once to refer in these columns to the services rendered by Commodore Goodenough, and we propose in our October number to give a fuller account of his distinguished career.

Correspondence.

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MR. SKERTCHLY ON THE OGOWÉ.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Your August number contained a strongly worded contradiction of the account of a journey stated to have been performed by me, which appeared in the *Academy* of May 1st. Upon reading this I immediately turned to the pages of that journal, where to my surprise I found that I was credited with having paid a visit to one of the Central African Lakes in 1868. Enquiry as to the source of this article elicited the fact that the *Academy* obtained it from a regular contributor, who, some short time previously, had had a few minutes' conversation with me on Equatorial Africa, but who was entirely erroneous in his statements as to my having visited the localities mentioned, and who had no authority whatever from me to publish them, since such a thing was quite against my desire.

The facts of the case are as follows:—

In 1870, not 1868 (when, for Mr. Walker's benefit, I state that I was in Australia), I paid a visit to the Gaboon for the purpose of making zoological collections. In the course of a journey to the eastward of the high land wherein the River Remboe takes its rise, I fell in with a man of Arab descent, who had lately come from the interior with slaves and ivory, and was going to the Congo mouth. In the course of several conversations I had with him, he told me that at so many days' (I forget the exact number) journey due east, there was a river as large as the Remboe at Chinchua (about a mile wide), which flowed to the right (south), and that this river entered the sea at the Congo, and that boats could go from it to the Ogowai through the network of lagoons with which the country is covered. So many days beyond this river, still going east, but with a little nothing, there was a range of mountains, one of which "smoked" beyond which again there was a large lake, so broad that when the wind blew strongly, the waves were so high as to endanger the safety of the canoes upon it, or even to prevent them being launched; while in crossing it land was lost sight of for a short time. From the distance he said he could pass over on each successive day, I estimated the river to be in about 12° E. long., while the lake by the same calculation would be in about 15° E. long. Since then I have anxiously looked out for news of this region from the Congo Expedition, but have hitherto refrained from making a mere report public.

Such was the account I received from Oblimba, and which I gave the gentleman who unfortunately published it in the *Academy*, crediting me with having visited a region of which I knew nothing except by report, and which drew forth the remarks of Mr. R. B. N. Walker.

As regards sundry remarks in Mr. Walker's letter, I only reply that he knows that it was impossible for me to see him earlier than I did, and that he gave me no information respecting the Ogowai. Finally as to the Arabs, there were two living within a few yards of his factory who were accustomed to make the journey between the Gaboon and Ogowai, of which he speaks so eulogistically, several times a year.—I am, &c.,

J. S. SKERTCHLY, F.R.G.S.

THE ARCTIC EXPLORERS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

MONSIEUR, — Permettez-moi de vous adresser ces quelques vers dédiés aux explorateurs du Pôle Nord. Ils ont été chantés dans le dernier Banquet du Caveau* aux applaudissements de tous les Convives, heureux de donner ainsi un témoignage d'admiration et de reconnaissance au Peuple Anglais, qui vient de se montrer si généreux, dernièrement encore, en faveur de nos pauvres inondés du midi.

Eu égard à l'intention, j'ose espérer, Monsieur, que vous voudrez bien excuser ma démarche, et agréer l'assurance de ma parfaite considération.

EUGÈNE GARRAUD,

Pensionnaire de la Comédie Française.

AUX EXPLORATEURS DU POLE NORD.

Amis, ce soir, je vous convie
A porter un toast aux Anglais,
Toujours prêts à risquer leur vie,
Pour la science et ses progrès.
Pour faire grand, rien ne leur coûte ;
Hier, sont partis bord-à-bord,
Leurs vaisseaux, qui du Pôle Nord,
Au monde vont frayer la route.

Je bois à vous, navigateurs,
Au succès de votre entreprise,
Au peuple qui la favorise,
À vos premiers explorateurs.

L'expédition valeureuse,
Qu'une fois encor vous tentez,
Sera peut-être désastreuse,
Il n'importe : heureux vous partez ;
Si vous courez à votre perte,
En cherchant ces froids horizons !
Vous immortalisez les noms,
De l' 'Alerte' et la 'Découverte.'

À votre but, navigateurs,
Cœurs vaillants remplis d'espérance,
Marchez avec persévérance,
A l'œuvre ! hardis explorateurs.

Si vous visitez le rivage,
Où Franklin et ses compagnons
Sont tous morts, luttant de courage,
Contre les âpres aquilons ;
Si vous rencontrez dans les glaces,
Ce funeste et mouvant flot,
D'où notre courageux Bellot,
Disparut sans laisser de traces,

Découvrez-vous, navigateurs,
Pour ce noble enfant de la France,
Pour ces martyrs de la science,
Priez, pour ces explorateurs !

Au retour de vos traversées,
Vous trouverez dans vos foyers,
Par la gloire, pour vous tressées,
Des couronnes de verts lauriers :
Les nations, l'âme attendrie,
Diront vos noms avec fierté,
Ceux qui servent l'humanité,
Ont tout l'Univers pour Patrie.

Salut à vous, navigateurs,
Fils de la science féconde,
Salut à vous, héros de l'Onde,
Salut, aux grands explorateurs.

10 Juillet 1875.

EUGÈNE GARRAUD.

* A literary club of Paris, of which Béranger, and other French song writers, have been members.—Ed.

Proceedings of Geographical Societies.

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BRITISH ASSOCIATION.

SECTION E.

Thursday, August 26th.

THE Geographical Section (E) met in the Blind Asylum, Bristol, on the above date, when Lieut.-General R. Strachey, R.E., C.S.I., F.R.S., took the chair. Vice-President Sir J. F. Davis, Bart., K.C.B., F.R.S., F.R.G.S. Secretaries, H. W. Bates, Esq., E. C. Rye, Esq., and F. F. Tuckett, Esq.

THE PRESIDENT'S ADDRESS.

The President commenced by alluding to the various lights in which geography had been viewed in the previous addresses of his predecessors. He then continued as follows:—

Following, then, a somewhat different path from those who have gone before me in treating of geography, I propose to speak of the physical causes which have impressed on our planet the present outlines and forms of its surface, have brought about its present conditions of climate, and have led to the development and distribution of the living beings found upon it.

In selecting this subject for my opening remarks, I have been not a little influenced by a consideration of the present state of geographical knowledge, and of the probable future of geographical investigation. It is plain that the field for mere topographical exploration is already greatly limited, and that it is continually becoming more restricted. Although no doubt much remains to be done in obtaining detailed maps of large tracts of the earth's surface, yet there is but comparatively a very small area with the essential features of which we are not now fairly well acquainted. Day by day our maps become more complete, and with our greatly improved means of communication the knowledge of distant countries is constantly enlarged and more widely diffused. Somewhat in the same proportion the demands for more exact information become more pressing. The necessary consequence is an increased tendency to give to geographical investigations a more strictly scientific direction. In proof of this I may instance the fact that the two British naval expeditions now being carried on, that of the 'Challenger' and that of the Arctic seas, have been organized almost entirely for general scientific research, and comparatively little for topographical discovery. Narratives of travels, which not many years ago might have been accepted as valuable contributions to our then less perfect knowledge, would now perhaps be regarded as superficial and insufficient. In short, the standard of knowledge of travellers and writers on geography must be raised to meet the increased requirements of the time.

Other influences are at work tending to the same result. The great advance made in all branches of natural science limits more and more closely the facilities for original research, and draws the observer of nature into more and more special studies, while it renders the acquisition by any individual of the highest standard of knowledge in more than one or two special subjects comparatively difficult and rare. At the same time the mutual interdependence of natural phenomena daily becomes more apparent; and it is of ever-increasing importance that there shall be some among the cultivators of natural knowledge who specially direct their attention to the general relations existing among all the

forces and phenomena of nature. In some important branches of such subjects, it is only through study of the local physical conditions of various parts of the earth's surface and the complicated phenomena to which they give rise, that sound conclusions can be established; and this study constitutes Physical or Scientific Geography. It is very necessary to bear in mind that a large portion of the phenomena dealt with by the sciences of observation relates to the earth as a whole in contradistinction to the substances of which it is formed, and can only be correctly appreciated in connection with the terrestrial or geographical conditions of the place where they occur. On the one hand, therefore, while the proper prosecution of the study of Physical Geography requires a sound knowledge of the researches and conclusions of students in the special branches of science, on the other success is not attainable in the special branches without suitable apprehension of geographical facts. For these reasons it appears to me that the general progress of science will involve the study of geography in a more scientific spirit, and with a clearer conception of its true function, which is that of obtaining accurate notions of the manner in which the forces of nature have brought about the varied conditions characterizing the surface of the planet which we inhabit.

In its broadest sense science is organized knowledge, and its methods consist of the observation and classification of the phenomena of which we become conscious through our senses, and the investigation of the causes of which these are the effects. The first step in geography, as in all other sciences, is the observation and description of the phenomena with which it is concerned; the next is to classify and compare this empirical collection of facts, and to investigate their antecedent causes. It is in the first branch of the study that most progress has been made, and to it indeed the notion of geography is still popularly limited. The other branch is commonly spoken of as physical geography, but it is more correctly the science of geography.

The progress of geography has thus advanced from first rough ideas of relative distance between neighbouring places, to correct views of the earth's form, precise determinations of position, and accurate delineations of the surface. The first impressions of the differences observed between distant countries were at length corrected by the perception of similarities no less real. The characteristics of the great regions of polar cold and equatorial heat, of the sea and land, of the mountains and plains, were appreciated; and the local variations of season and climate, of wind and rain, were more or less fully ascertained. Later, the distribution of plants and animals, their occurrence in groups of peculiar structure in various regions, and the circumstances under which such groups vary from place to place gave rise to fresh conceptions. Along with these facts were observed the peculiarities of the races of men—their physical form, languages, customs, and history—exhibiting on the one hand striking differences in different countries, but on the other often connected by a strong stamp of similarity over large areas.

By the gradual accumulation and classification of such knowledge the scientific conception of geographical unity and continuity was at length formed, and the conclusion established that while each different part of the earth's surface has its special characteristics, all animate and inanimate nature constitutes one general system, and that the particular features of each region are due to the operation of universal laws acting under varying local conditions. It is upon such a conception that is now brought to bear the doctrine, very generally accepted by the naturalists of our own country, that each successive phase of the earth's history, for an indefinite period of time, has been derived from that which preceded it, under the operation of the forces of nature as we now find them; and that, so far as obser-

vation justifies the adoption of any conclusions on such subjects, no change has ever taken place in those forces, or in the properties of matter. This doctrine is commonly spoken of as the doctrine of evolution, and it is to its application to geography that I wish to direct your attention.

I desire here to remark that in what I am about to say I altogether leave on one side all questions relating to the origin of matter, and of the so-called forces of nature which give rise to the properties of matter. In the present state of knowledge such subjects are, I conceive, beyond the legitimate field of physical science, which is limited to discussions directly arising on facts within the reach of observation, or on reasonings based on such facts. It is a necessary condition of the progress of knowledge that the line between what properly is or is not within the reach of human intelligence is ill-defined, and that opinions will vary as to where it should be drawn; for it is the avowed and successful aim of science to keep this line constantly shifting by pushing it forward; many of the efforts made to do this are no doubt founded in error, but all are deserving of respect that are undertaken honestly.

The conception of evolution is essentially that of a passage to the state of things which observation shows us to exist now, from some preceding state of things. Applied to geography, that is to say to the present condition of the earth as a whole, it leads up to the conclusion that the existing outlines of sea and land have been caused by modifications of pre-existing oceans and continents, brought about by the operation of forces which are still in action, and which have acted from the most remote past of which we can conceive; that all the successive forms of the surface,—the depressions occupied by the waters, and the elevations constituting mountain-chains,—are due to these same forces; that these have been set up, first, by the secular loss of heat which accompanied the original cooling of the globe, and second, by the annual or daily gain and loss of heat received from the sun acting on the matter of which the earth and its atmosphere are composed; that all variations of climate are dependent on differences in the condition of the surface; that the distribution of life on the earth, and the vast varieties of its forms, are consequences of contemporaneous or antecedent changes of the forms of the surface and climate; and thus that our planet as we now find it is the result of modifications gradually brought about in its successive stages, by the necessary action of the matter out of which it has been formed, under the influence of the matter which is external to it.

I shall state briefly the grounds on which these conclusions are based.

So far as concerns the inorganic fabric of the earth, that view of its past history which is based on the principle of the persistence of all the forces of nature, may be said to be now universally adopted. This teaches that the almost infinite variety of natural phenomena arises from new combinations of old forms of matter, under the action of new combinations of old forms of force. Its recognition has, however, been comparatively recent, and is in a great measure due to the teachings of that eminent geologist, the late Sir Charles Lyell, whom we have lost during the past year.

When we look back by the help of geological science to the more remote past, through the epochs immediately preceding our own, we find evidence of marine animals—which lived, were reproduced, and died—possessed of organs proving that they were under the influence of the heat and light of the sun; of seas whose waves rose before the winds, breaking down cliffs, and forming beaches of boulders and pebbles; of tides and currents spreading out banks of sand and mud, on which are left the impress of the ripple of the water, of drops of rain, and of the track of animals; and

all these appearances are precisely similar to those we observe at the present day as the result of forces which we see actually in operation. Every successive stage, as we recede in the past history of the earth, teaches the same lesson. The forces which are now at work, whether in degrading the surface by the action of seas, rivers, or frosts, and in transporting its fragments into the sea, or in reconstituting the land by raising beds laid out in the depth of the ocean, are traced by similar effects as having continued in action from the earliest times.

Thus pushing back our inquiries we at last reach the point where the apparent cessation of terrestrial conditions such as now exist requires us to consider the relation in which our planet stands to other bodies in celestial space; and vast though the gulf be that separates us from these, science has been able to bridge it. By means of spectroscopic analysis it has been established that the constituent elements of the sun and other heavenly bodies are substantially the same as those of the earth. The examination of the meteorites which have fallen on the earth from the interplanetary spaces, shows that they also contain nothing foreign to the constituents of the earth. The inference seems legitimate, corroborated as it is by the manifest physical connection between the sun and the planetary bodies circulating around it, that the whole solar system is formed of the same descriptions of matter, and subject to the same general physical laws. These conclusions further support the supposition that the earth and other planets have been formed by the aggregation of matter once diffused in space around the sun; that the first consequence of this aggregation was to develop intense heat in the consolidating masses; that the heat thus generated in the terrestrial sphere was subsequently lost by radiation; and that the surface cooled and became a solid crust, leaving a central nucleus of much higher temperature within. The earth's surface appears now to have reached a temperature which is virtually fixed, and on which the gain of heat from the sun is, on the whole, just compensated by the loss by radiation into surrounding space.

Such a conception of the earliest stage of the earth's existence is commonly accepted, as in accordance with observed facts. It leads to the conclusion that the hollows on the surface of the globe occupied by the ocean, and the great areas of dry land, were original irregularities of form caused by unequal contraction; and that the mountains were corrugations, often accompanied by ruptures, caused by the strains developed in the external crust by the force of central attraction exerted during cooling, and were not due to forces directly acting upwards generated in the interior by gases or otherwise. It has recently been very ably argued by Mr. Mallet that the phenomena of volcanic heat are likewise consequences of extreme pressures in the external crust, set up in a similar manner, and are not derived from the central heated nucleus.

There may be some difficulty in conceiving how forces can have been thus developed sufficient to have produced the gigantic changes which have occurred in the distribution of land and water over immense areas, and in the elevation of the bottoms of former seas so that they now form the summits of the highest mountains, and to have effected such changes within the very latest geological epoch. These difficulties in great measure arise from not employing correct standards of space and time in relation to the phenomena. Vast though the greatest heights of our mountains and depths of our seas may be, and enormous though the masses which have been put into motion, when viewed according to a human standard, they are insignificant in relation to the globe as a whole. Such heights and depths (about 6 miles) on a sphere of 10 feet in diameter would be represented on a true scale by elevations and depressions of less than the tenth part of an inch, and the

average elevation of the whole of the dry land (about 1000 feet) above the mean level of the surface would hardly amount to the thickness of an ordinary sheet of paper. The forces developed by the changes of the temperature of the earth as a whole must be proportionate to its dimensions; and the results of their action on the surface in causing elevations, contortions, or disruptions of the strata, cannot be commensurable with those produced by forces having the intensities, or by strains in bodies of the dimensions, with which our ordinary experience is conversant.

The difficulty in respect to the vast extent of past time is perhaps less great, the conception being one with which most persons are now more or less familiar. But I would remind you, that great though the changes in human affairs have been since the most remote epochs of which we have records in monuments or history, there is nothing to indicate that within this period has occurred any appreciable modification of the main outlines of land and sea, or of the conditions of climate, or of the general characters of living creatures; and that the distance that separates us from those days is as nothing when compared to the remoteness of past geological ages. No useful approach has yet been made to a numerical estimate of the duration even of that portion of geological time which is nearest to us; and we can say little more than that the earth's past history extends over hundreds of thousands or millions of years.

The solid nucleus of the earth with its atmosphere, as we now find them, may thus be regarded as exhibiting the residual phenomena which have resulted on its attaining a condition of practical equilibrium, the more active process of aggregation having ceased, and the combination of its elements into the various solid, liquid, or gaseous matters found on or near the surface having been completed. During its passage to its present state many wonderful changes must have taken place, including the condensation of the ocean, which must have long continued in a state of ebullition, or bordering on it, surrounded by an atmosphere densely charged with watery vapour. Apart from the movements in its solid crust caused by the general cooling and contraction of the earth, the higher temperature due to its earlier condition hardly enters directly into any of the considerations that arise in connection with its present climate, or with the changes during past time which are of most interest to us; for the conditions of climate and temperature at present, as well as in the period during which the existence of life is indicated by the presence of fossil remains, and which have affected the production and distribution of organized beings, are dependent on other causes, to a consideration of which I now proceed.

The natural phenomena relating to the atmosphere are often extremely complicated and difficult of explanation; and meteorology is the least advanced of the branches of physical science. But sufficient is known to indicate, without possible doubt, that the primary causes of the great series of phenomena, included under the general term climate, are the action and reaction of the mechanical and chemical forces set in operation by the sun's heat, varied from time to time and from place to place by the influence of the position of the earth in its orbit, of its revolution on its axis, of geographical position, elevation above the sea-level, and condition of the surface, and by the great mobility of the atmosphere and the ocean.

The intimate connection between climate and local geographical conditions is everywhere apparent; nothing is more striking than the great differences between neighbouring places where the effective local conditions are not alike, which often far surpass the contrasts attending the widest separation possible on the globe. Three or four miles of vertical height produce effects almost equal to those of transfer from the equator

to the poles. The distribution of the great seas and continents give rise to periodical winds—the trades and monsoons—which maintain their general characteristics over wide areas, but present almost infinite local modifications whether of season, direction, or force. The direction of the coasts and their greater or less continuity greatly influence the flow of the currents of the ocean; and these, with the periodical winds, tend on the one hand to equalize the temperature of the whole surface of the earth, and on the other to cause surprising variations within a limited area. Ranges of mountains, and their position in relation to the periodical or rain-bearing winds, are of primary importance in controlling the movements of the lower strata of the atmosphere, in which, owing to the laws of elastic gases, the great mass of the air and watery vapour are concentrated. By their presence they may either constitute a barrier across which no rain can pass, or determine the fall of torrents of rain around them. Their absence or their unfavourable position, by removing the causes of condensation, may lead to the neighbouring tracts becoming rainless deserts.

The difficulties that arise in accounting for the phenomena of climate on the earth as it now is, are naturally increased when the attempt is made to explain what is shown by geological evidence to have happened in past ages. The disposition has not been wanting to get over these last difficulties by invoking supposed changes in the sources of terrestrial heat, or in the conditions under which heat has been received by the earth, for which there is no justification in fact, in a manner similar to that in which violent departures from the observed course of nature have been assumed to account for some of the analogous mechanical difficulties.

Among the most perplexing of such climatal problems are those involved in the former extension of glacial action of various sorts over areas which could hardly have been subject to it under existing terrestrial and solar conditions; and in the discovery, conversely, of indications of far higher temperatures at certain places than seems compatible with their high latitudes; and in the alternations of such extreme conditions. The true solution of these questions has apparently been found in the recognition of the disturbing effects of the varying eccentricity of the earth's orbit, which, though inappreciable in the comparatively few years to which the affairs of men are limited, become of great importance in the vastly increased period brought into consideration when dealing with the history of the earth. The changes of eccentricity of the orbit are not of a nature to cause appreciable differences in the mean temperature either of the earth generally or of the two hemispheres; but they may, when combined with changes of the direction of the earth's axis caused by the precession of the equinoxes and nutation, lead to exaggeration of the extremes of heat and cold, or to their diminution; and this would appear to supply the means of explaining the observed facts, though doubtless the detailed application of the conception will long continue to give rise to discussions. Mr. Croll, in his book entitled *Climate and Time*, has recently brought together, with much research, all that can now be said on this subject; and the general correctness of that part of his conclusions which refers to the periodical occurrence of epochs of greatly increased winter cold and summer heat in one hemisphere, combined with a more equable climate in the other, appears to me to be fully established.

These are the considerations which are held to prove that the inorganic structure of the globe through all its successive stages—the earth beneath our feet, with its varied surface of land and sea, mountain and plain, and with its atmosphere which distributes heat and moisture over that surface,—has been evolved as the necessary result of the original aggregation of matter at some extremely remote period, and of the subsequent

modification of that matter in condition and form under the exclusive operation of invariable physical forces.

From these investigations we carry on the inquiry to the living creatures found upon the earth; what are their relations one to another, and what to the inorganic world with which they are associated?

This inquiry first directed to the present time, and thence carried backwards as far as possible into the past, proves that there is one general system of life, vegetable and animal, which is co-extensive with the earth as it now is, and as it has been in all the successive stages of which we obtain a knowledge by geological research. The phenomena of life, as thus ascertained, are included in the organization of living creatures, and their distribution in time and place. The common bond that subsists between all vegetables and animals is testified by the identity of the ultimate elements of which they are composed. These elements are carbon, oxygen, hydrogen, and nitrogen, with a few others in comparatively small quantities; the whole of the materials of all living things being found among those that compose the inorganic portion of the earth.

The close relation existing between the least specialized animals and plants, and between these and organic matter not having life, and even with inorganic matter, is indicated by the difficulty that arises in determining the nature of the distinctions between them. Among the more highly developed members of the two great branches of living creatures, the well-known similarities of structure observed in the various groups indicate a connection between proximate forms which was long seen to be akin to that derived through descent from a common ancestor by ordinary generation.

The facts of distribution show that certain forms are associated in certain areas, and that as we pass from one such area to another the forms of life change also. The general assemblages of living creatures in neighbouring countries easily accessible to one another, and having similar climates, resemble one another; and much in the same way, as the distance between areas increases, or their mutual accessibility diminishes, or the conditions of climate differ, the likeness of the forms within them becomes continually less apparent. The plants and animals existing at any time in any locality tend constantly to diffuse themselves around that local centre, this tendency being controlled by the conditions of climate, &c., of the surrounding area, so that under certain unfavourable conditions diffusion ceases.

The possibilities of life are further seen to be everywhere directly influenced by all external conditions, such as those of climate, including temperature, humidity, and wind; of the length of the seasons and days and nights; of the character of the surface whether it be land or water, and whether it be covered by vegetation or otherwise; of the nature of the soil; of the presence of other living creatures, and many more. The abundance of forms of life in different areas (as distinguished from number of individuals) is also found to vary greatly, and to be related to the accessibility of such areas to immigration from without; to the existence, within or near the areas, of localities offering considerable variations of the conditions that chiefly affect life; and to the local climate and conditions being compatible with such immigration.

For the explanation of these and other phenomena of organization and distribution, the only direct evidence that observation can supply is that derived from the mode of propagation of creatures now living; and no other mode is known than that which takes place by ordinary generation, through descent from parent to offspring. It was left for the genius of Darwin to point out how the course of nature as it now acts in the reproduction of living creatures, is sufficient for the interpretation of what had previously been incomprehensible in these matters. He showed how propagation by descent

operates, subject to the occurrence of certain small variations in the offspring, and that the preservation of some of these varieties to the exclusion of others follows as a necessary consequence when the external conditions are more suitable to the preserved forms than to those lost. The operation of these causes he called Natural Selection. Prolonged over a great extent of time it supplies the long-sought key to the complex system of forms either now living on the earth, or the remains of which are found in the fossil state, and explains the relations among them, and the manner in which their distribution has taken place in time and space.

Thus we are brought to the conclusion that the directing forces which have been efficient in developing the existing forms of life from those which went before them, are those same successive external conditions, including both the forms of land and sea, and the character of the climate, which have already been shown to arise from the gradual modification of the material fabric of the globe as it slowly attained to its present state. In each succeeding epoch, and in each separate locality, the forms preserved and handed on to the future were determined by the general conditions of surface at the time and place; and the aggregate of successive sets of conditions over the whole earth's surface has determined the entire series of forms which have existed in the past, and have survived till now.

As we recede from the present into the past, it necessarily follows, as a consequence of the ultimate failure of all evidence as to the conditions of the past, that positive testimony of the conformity of the facts with the principle of evolution gradually diminishes, and at length ceases. In the same way positive evidence of the continuity of action of all the physical forces of nature eventually fails. But inasmuch as the evidence so far as it can be procured, supports the belief in this continuity of action, and as we have no experience of the contrary being possible, the only justifiable conclusion is, that the production of life must have been going on as we now know it, without any intermission, from the time of its first appearance on the earth. These considerations manifestly afford no sort of clue to the origin of life. They only serve to take us back to a very remote epoch, when the living creatures differed greatly in detail from those of the present time, but had such resemblances to them as to justify the conclusion that the essence of life then was the same as now; and through that epoch into an unknown anterior period, during which the possibility of life, as we understand it, began, and from which has emerged in a way that we cannot comprehend, matter with its properties, bound together by what we call the elementary physical forces. There seems to be no foundation in any observed fact for suggesting that the wonderful property which we call life appertains to the combinations of elementary substances in association with which it is exclusively found, otherwise than as all other properties appertain to the particular forms or combinations of matter with which they are associated. It is no more possible to say how originated or operates the tendency of some sorts of matter to take the form of vapours, or fluids, or solid bodies, in all their various shapes, or for the various sorts of matter to attract one another or combine, than it is to explain the origin in certain forms of matter of the property we call life, or the mode of its action. For the present, at least, we must be content to accept such facts as the foundation of positive knowledge, and from them to rise to the apprehension of the means by which nature has reached its present state, and is advancing into an unknown future.

These conceptions of the relations of animal and vegetable forms to the earth in its successive stages lead to views of the significance of type (*i.e.* the general system of structure running through various groups of organized beings) very different from those under which

it was held to be an indication of some occult power directing the successive appearance of living creatures on the earth. In the light of evolution, type is nothing more than the direction given to the actual development of life by the surface-conditions of the earth, which have supplied the forces that controlled the course of the successive generations leading from the past to the present. There is no indication of any inherent or pre-arranged disposition towards the development of life in any particular direction. It would rather appear that the actual face of nature is the result of a succession of apparently trivial incidents, which by some very slight alteration of local circumstances might often, it would seem, have been turned in a different direction. Some otherwise unimportant difference in the constitution or sequence of the substrata at any locality might have determined the elevation of mountains where a hollow filled by the sea was actually formed, and thereby the whole of the climatal and other conditions of a large area would have been changed, and an entirely different impulse given to the development of life locally, which might have impressed a new character on the whole face of nature.

But further, all that we see or know to have existed upon the earth has been controlled to its most minute details by the original constitution of the matter which was drawn together to form our planet. The actual character of all inorganic substances, as of all living creatures, is only consistent with the actual constitution and proportions of the various substances of which the earth is composed. Other proportions than the actual ones in the constituents of the atmosphere would have required an entirely different organization in all air-breathing animals, and probably in all plants. With any considerable difference in the quantity of water either in the sea or distributed as vapour, vast changes in the constitution of living creatures must have been involved. Without oxygen, hydrogen, nitrogen, or carbon, what we term life would have been impossible. But such speculations need not be extended.

The substances of which the earth is now composed are identical with those of which it has always been made up; so far as is known it has lost nothing and has gained nothing, except what has been added in extremely minute quantities by the fall of meteorites. All that is or ever has been upon the earth is part of the earth, has sprung from the earth, is sustained by the earth, and returns to the earth; taking back thither what it withdrew, making good the materials on which life depends, without which it would cease, and which are destined again to enter into new forms, and contribute to the ever onward flow of the great current of existence.

The progress of knowledge has removed all doubt as to the relation in which the human race stands to this great stream of life. It is now established that man existed on the earth at a period vastly anterior to any of which we have records in history or otherwise. He was the contemporary of many extinct mammalia at a time when the outlines of land and sea, and the conditions of climate over large parts of the earth, were wholly different from what they now are, and our race has been advancing towards its present condition during a series of ages for the extent of which ordinary conceptions of time afford no suitable measure. These facts have, in recent years, given a different direction to opinion as to the manner in which the great groups of mankind have become distributed over the areas where they are now found; and difficulties once considered insuperable become soluble when regarded in connection with those great alterations of the outlines of land and sea which are shown to have been going on up to the very latest geological periods. The ancient monuments of Egypt, which take us back perhaps 7000 years from the present time, indicate that when they were erected the neighbouring countries were in a condition of civilization not

very greatly different from that which existed when they fell under the dominion of the Romans or Muhammadans hardly 1500 years ago; and the progress of the population towards that condition can hardly be accounted for otherwise than by prolonged gradual transformations going back to times so far distant as to require a geological rather than an historical standard of reckoning.

Man, in short, takes his place with the rest of the animate world, in the advancing front of which he occupies so conspicuous a position. Yet for this position he is indebted not to any exclusive powers of his own, but to the wonderful compelling forces of nature which have lifted him entirely without his knowledge, and almost without his participation, so far above the animals of whom he is still one, though the only one able to see or consider what he is.

For the social habits essential to his progress, which he possessed even in his most primitive state, man is without question dependent on his ancestors, as he is for his form and other physical peculiarities. In his advance to civilization he was insensibly forced, by the pressure of external circumstances, through the more savage condition, in which his life was that of the hunter, first to pastoral and then to agricultural occupations. The requirements of a population gradually increasing in numbers could only be met by a supply of food more regular and more abundant than could be provided by the chase. But the possibility of the change from the hunter to the shepherd or herdsman rested on the antecedent existence of animals suited to supply man with food, having gregarious habits, and fitted for domestication, such as sheep, goats, and horned cattle; for their support the social grasses were a necessary preliminary, and for the growth of these in sufficient abundance land naturally suitable for pasture was required. A further evasion of man's growing difficulty in obtaining sufficient food was secured by aid of the cereal grasses, which supplied the means by which agriculture, the outcome of pastoral life, became the chief occupation of more civilized generations. Lastly, when these increased facilities for providing food were in turn overtaken by the growth of the population, new power to cope with the recurring difficulty was gained through the cultivation of mechanical arts and of thought, for which the needful leisure was for the first time obtained when the earliest steps of civilization had removed the necessity for unremitting search after the means of supporting existence. Then was broken down the chief barrier in the way of progress, and man was carried forward to the condition in which he now is.

It is impossible not to recognize that the growth of civilization, by aid of its instruments, pastoral and agricultural industry, was the result of the unconscious adoption of defences supplied by what was exterior to man, rather than of any truly intelligent steps taken with forethought to attain it; and in these respects man, in his struggle for existence, has not differed from the humbler animals or from plants. Neither can the marvellous ultimate growth of his knowledge, and his acquisition of the power of applying to his use all that lies without him, be viewed as differing in anything but form or degree from the earlier steps in his advance. The needful protection against the foes of his constantly increasing race—the legions of hunger and disease, infinite in number, ever changing their mode of attack or springing up in new shapes—could only be attained by some fresh adaptation of his organization to his wants, and this has taken the form of that development of intellect which has placed all other creatures at his feet and all the powers of nature in his hand.

The picture that I have thus attempted to draw presents to us our earth carrying with it, or receiving from the sun or other external bodies, as it travels through celestial space, all the materials and all the forces by

help of which are fashioned whatever we see upon it. We may liken it to a great complex living organism, having an inert substratum of inorganic matter on which are formed many separate organized centres of life, but all bound up together by a common law of existence, each individual part depending on those around it, and on the past condition of the whole. Science is the study of the relations of the several parts of this organism one to another, and of the parts to the whole. It is the task of the geographer to bring together from all places on the earth's surface the materials from which shall be deduced the scientific conception of nature. Geography supplies the rough blocks wherewith to build up that grand structure towards the completion of which science is striving. The traveller, who is the journeyman of science, collects from all quarters of the earth observations of fact, to be submitted to the research of the student, and to provide the necessary means of verifying the inductions obtained by study or the hypotheses suggested by it. If, therefore, travellers are to fulfil the duties put upon them by the division of scientific labour, they must maintain their knowledge of the several branches of science at such a standard as will enable them thoroughly to apprehend what are the present requirements of science, and the classes of fact on which fresh observation must be brought to bear to secure its advance. Nor does this involve any impracticable course of study. Such knowledge as will fit a traveller for usefully participating in the progress of science is now placed within the reach of every one. The lustre of that energy and self-devotion which characterize the better class of explorers will not be dimmed by joining to it an amount of scientific training which will enable them to bring away from distant regions enlarged conceptions of other matters besides mere distance and direction. How great is the value to science of the observations of travellers endowed with a share of scientific instruction is testified by the labours of many living naturalists. In our days this is especially true; and I appeal to all who desire to promote the progress of geographical science as explorers, to prepare themselves for doing so efficiently, while they yet possess the vigour and physical powers that so much conduce to success in such pursuits.

NOTICE.

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THE
GEOGRAPHICAL MAGAZINE.

OCTOBER, 1875.

JAMES GRAHAM GOODENOUGH.

It is too painful a task to write fully of one so lately lost to us, so dearly loved as Commodore Goodenough. The blow is too recent and too heavy. Yet affection for his memory obliges us to place on record at least the bare facts of the good and useful life of one who contributed to and took so warm an interest in the success of this journal.

His family had been settled at Broughton Pogges in Oxfordshire from the end of the sixteenth century, and held the advowson of the living. Samuel Goodenough, a son of the rector of this village, became Bishop of Carlisle in 1808, and was an eminent botanist, Treasurer of the Linnæan, and a Fellow of the Royal Society. His eldest son Robert was rector of Carlton, and married Cecilia Markham, youngest daughter of the Archbishop of York. His second son Edmund was born in 1785. He took the highest university honours at Oxford in 1804, and became tutor and censor of Christ Church. His tastes and accomplishments were not confined to the classics, but extended to modern literature and the fine arts. He was Head Master of Westminster School from 1819 to 1828, and Dean of Wells from 1831 to 1845. Dean Goodenough was a Fellow of the Royal Society, one of the original Fellows of the Royal Geographical Society, and a member of its first Council. He also contributed a paper on the Black Sea to the first volume of its journal. In 1821 he married Frances, daughter of Samuel Pepys Cockerell, Esq., and the late Commodore was his second son.

James Graham Goodenough was born on the 3rd of December 1830, and at the age of 11 he went to Westminster School. He was as a boy what he continued to be as a man—honourable, true, tender-hearted, modest, brave, and a hater of all things evil. There was something in his society which raised others unconsciously. Yet he was not one of those boys who were never to be found in the fighting green or out of bounds. On the contrary, while joining heartily in all that other boys did, whether allowed or forbidden, he kept all real evil from himself and his companions by a sort of natural force. Every one liked him, and rejoiced at his successes in school and on the water, which were extraordinary for so young a boy.

On May 7th, 1844, he entered the navy as a naval cadet on board H.M.S. 'Collingwood,' a line-of-battle ship commissioned to bear the flag of Admiral Sir George Seymour on the Pacific Station. His father and mother, with his brothers and sisters, came to

Bembridge while the 'Collingwood' was lying at Spithead, and their little yacht the 'Traveller' daily hovered round the great ship. When, on the 7th of September 1844, the 'Collingwood' sailed for an absence of four years, the Dean followed her far out to sea, very loth to lose sight of the new floating home of his boy. They were never to meet again in this world, for the Dean of Wells died on May 2nd, 1845, more than three years before the 'Collingwood's' return.

As a midshipman, young Goodenough fulfilled the promise he had given as a boy at Westminster. Always modest and unassuming, he naturally took the lead in everything; the best as a linguist, in navigation, in seamanship, and in all exercises, and among the foremost in all expeditions. His messmates looked to him as their leader, almost as their guide; and none of them ever ceased to look back, with regret, to those happy four years. On every emergency his first thought was for others. Once he and another lad took a long excursion among the wild ravines of Juan Fernandez. Scrambling through masses of huge leaves which concealed everything in front, Goodenough was a few paces ahead. Suddenly his companion heard a crashing sound, and, as he crept forward, Goodenough's warning voice urged him anxiously not to follow. At the moment he must have been in great agony. He had fallen down a sheer precipice, and had sprained his ankle, besides being severely crushed and bruised. It was twenty-four hours before he could be found and extricated.* His companion never forgot that warning cry, which probably saved his life, and which added a feeling of reverence to his love for such a messmate. But this was Goodenough's character. In pain or in danger his first thought was for others.

When the dear old 'Collingwood' was paid off, Goodenough joined the 'Cyclops,' under Captain Hastings, and went to the coast of Africa. On the 23rd of June, 1851, he was promoted to the rank of lieutenant for passing the best examination at the College; and from the 11th of September 1851, to the 6th of May 1854, he served as lieutenant on board the 'Centaur,' the flagship on the Brazilian station.

During the war with Russia Goodenough served under Captain Caffin in the 'Hastings,' from February to December 1855, and was gazetted as having been

* See *Four Years in the Pacific, in H.M.S. 'Collingwood'* by the Hon. Fred. Walpole (Bentley, 1849, 2 vols.), i., p. 376.

engaged with rocket-boats at the bombardment of Sweaborg. He then obtained a brief interval of rest, after eleven years of continuous service, and went on two months' leave to join his sister at Malta. But on the 15th of February, 1856, he was again employed to command the gunboat 'Goshawk,' and he was in her at the great review after the peace, and until September 3rd. He then went out to China in the 'Raleigh,' joined the flagship 'Calcutta,' and was actively employed in the operations of the Chinese war. He was gazetted on four occasions. On the 6th of July, 1857, Sir Robert M'Clure reported that Goodenough captured a large snake-boat from pirates in the Canton River. On August 1st, 1857, he was gazetted as having been thrice in action in boats, at the destruction of Chinese war-junks. On February 26th, 1858, he was gazetted for gallant service at the assault and capture of Canton, and on the 28th of July for his services on shore at the capture of Chinese forts in the Peiho River. He had been specially promoted to the rank of Commander on the 26th of February 1858, the day of the capture of Canton.

In August 1859 he returned to England in the 'Calcutta,' and from September 1859, to November 12th, 1861, he commanded the 'Renard,' also on the China station. He then had another brief season of rest at home, a time which was very dear to one of his affectionate, loving nature. But on July 3rd, 1862, he was appointed to the 'Revenge,' in the Channel squadron, and had the pleasure of again serving with his Captain of the old 'Collingwood' days, the late Sir Robert Smart. On the 9th of May, 1863, Goodenough was promoted to the rank of captain, and was on shore for nearly eighteen months, thus again earning a brief period of refreshing rest.

It was in 1863 that Captain Goodenough became a Fellow of the Royal Geographical Society, and a member of the Geographical Club. He also became a member of the Hakluyt Society, and undertook the translation and editing of *Bethencourt's Conquest of the Canary Islands*, but subsequent employment prevented him from completing it. In August 1863 he attended the British Association at Newcastle, and took a very active part in the Geographical Section, which was particularly busy during that meeting. Then followed a union which increased very much the happiness of the last eleven years of Goodenough's life. He was married on the 30th of May, 1864, to Victoria, the daughter of William John Hamilton, Esq., and of the Hon. Margaret, daughter of the 13th Viscount Dillon. Mr. Hamilton was an ardent geographer, and received the medal of the Royal Geographical Society for his survey of Asia Minor. He was President of the Geographical Society in 1837, 1841, 1842, and 1847, and afterwards of the Geological Society. His death took place in June 1867.

Captain Goodenough's happiness was secured by his marriage, in the perfect companionship he enjoyed, and in his loving interest and solicitude for his two boys, Leonard and William. He had reaped the reward of a good and noble life, of long and true service, and we may rejoice that he was spared to enjoy it for several happy years. Yet even at this time he was usefully and actively employed in examining the American dockyards; and in August 1864 the Lords of the Admiralty expressed satisfaction at the way in

which he had performed the special services entrusted to him in visiting the United States, to collect information on the subject of the ships and armaments of the Republic.

On the 2nd of November, 1864, he was appointed to the 'Victoria,' the last commissioned three-decker, to bear the flag of his old captain, Admiral Sir Robert Smart, in the Mediterranean. There he did most valuable service in watching over and training the young officers under his charge, who will, in their turn, do good and true service for their country. In 1867 he was appointed to the five-masted iron-clad 'Minotaur,' which he commanded until the 25th of October 1870.

From the 9th to the 14th of February, 1871, Captain Goodenough was employed in revictualling Paris after the Prussian siege, and he afterwards, accompanied by his wife, distributed the *Daily News* "Peasant Relief Fund." Mr. W. Bullock Hill thus writes to the *Daily News*:—"In the dreariest period of the gloomiest of Novembers, when autumnal rains were giving place to snow and sleet and frozen winter fogs, and we, whose business it was to convey food and clothing over the slippery and almost impassable roads to the destitute in the villages about Sedan, were almost in despair at the task we had undertaken, and were in sore need of encouragement, there came a man the very sight of whom at once communicated new life to us. Here was a man, the very model of an Englishman, with unbounded energy, and combining extreme gentleness with an iron sense of duty, born to command, and with a genius for communicating the love of order and regularity which characterised him—a man before whom one could only feel inclined to bow down—here was this man come to place himself meekly under orders, and to go plodding day after day through snow and slush. When the news of Commodore Goodenough's death reaches the villages about Sedan, where he laboured and made himself beloved, there will be grief as genuine as his friends and countrymen must feel for him, and grief which he himself would have valued not the least amongst the tributes to his memory."

Mr. Bullock Hill of the *Daily News* was one of Captain Goodenough's colleagues, and we sincerely thank him for this tribute to the memory of our dear friend.

From the 3rd of September, 1871, to the 9th of August, 1872, Captain Goodenough was employed by the Admiralty in visiting and reporting upon the naval dockyards and armaments of Russia, Austria, Italy, and France; and at this period also he urged upon the attention of the Admiralty the importance of naval education, at the same time submitting a feasible scheme. His able and most interesting article on the subject of "Naval Education" appeared in our number of *Ocean Highways* for February 1873, p. 345.

On the 22nd of May, 1873, he was appointed to H.M.S. 'Pearl,' as Commodore on the Australian Station. He went out with the resolution of doing valuable work, of advancing hydrography and geography, and of furthering the cause of humanity, and in this he has nobly succeeded, although we cannot reconcile ourselves to the horrible circumstances of his death.

Commodore Goodenough communicated to us a very interesting paper on Amsterdam Island during

his passage out;* and he then proceeded to the Fiji Islands. In 1874 he arrived at Levuka, and practically put an end to the so-called Constitutional Government, which had for nearly three years harassed Fiji. We have, in a previous number (March 1875, p. 85), noticed his able report on the Fiji Islands, and we have shown that the principal measures connected with the acquisition of this colony are due to him, and that they originated from his statesman-like advice. Faction may have been induced to depreciate his report, but it will long be valued and referred to as an inexhaustible store-house of information on the subject of the Fiji colony.

Nor, as we then pointed out, were his services in connection with Fiji confined to the preparation of a lucid report. He preserved order for many months, collected accurate information, and prepared the way for annexation with remarkable tact and judgment. Fiji became a British colony on October 10th, 1874; and among the names most honourably connected with the first page of its history that of Goodenough will be foremost.

For his gallantry during the Chinese campaign, and for his other war services, Commodore Goodenough was created a Companion of the military division of the Order of the Bath on May 29th, 1875; and for his distinguished services in connection with the acquisition of the Fiji colony he was also made a Companion of the Order of St. Michael and St. George. He had previously received one of the good-service pensions.

Commodore Goodenough has been murdered by the savages of Santa Cruz. He was doing his plain duty in landing on the island, with his usual tact and sound judgment. He nobly fell, and we cannot help repeating the words of Captain Moresby, who served under him on the Australian station. Captain Moresby thus writes:—

"I will not speak of the loss his friends sustain in him, of his generous, genial, gallant nature, his almost womanly power of sympathy, his sound judgment, always at the service of a friend; I should but multiply words where they are not needed, for every man who called him "friend" knows that he was strong, gentle, true, incapable of the least littleness, able and willing for all good work.

"It will be no part of our sorrow that he has died obscurely,—a man can do nothing nobler than his duty, and he is sure to have been found doing that,—nor that his call has been, perhaps, sudden, for that pure and devout spirit was ever ready to enter the presence of its Maker; but we shall all lament that the future greatness—a greatness in which he would have been beloved—for which his fine sailor-like and scientific qualities, his grasp of mind, his promptness in action, seemed to destine him, has not been achieved. In this feeling I am sure that we, lately his officers, shall be joined by the whole of our profession—nay, by the nation at large, for already he had been recognized as no common man, and the loss is a national one."

Mr. E. J. Reed, C.B., also expresses the great loss that the country has sustained by the death of this lamented officer. He says:—"I have viewed with the greatest admiration the ability, the resolution, and the

scientific spirit with which very many of our naval officers have adapted themselves to the altered circumstances of their profession. I could name several Admirals and numerous Post Captains and Commanders who now adorn the naval service by the display of a degree of skill and mastery of novel conditions for which we really were not entitled by our previous exertions in naval training to look with any confidence. Among this class of officers the now lamented Goodenough held a very prominent place. Although deficient in none of those vigorous qualities which win renown for naval men, he was a most thoughtful and scientific officer, acquainted with the latest developments of naval gunnery and war ship-building, and capable of rendering the best service to his country at a period when good service in the Navy demands the exercise of higher qualities in many respects than naval men ever before needed. His reputation was not confined to this country only, and the news of his death will have been received with more than a passing regret throughout the naval professions of Europe.

"It is sad to think of such a life as his being sacrificed by the treachery of a savage in a remote and obscure corner of the world; but the event should, I think, serve to remind those who need such a reminder, that it is not only faithful service which the country demands and receives from its naval and military officers; it is their very lives also that are offered to us whenever the public service may, even by its accidents, require them."

On August the 12th Commodore Goodenough landed at Carlisle Bay, on Santa Cruz Island, to open kindly intercourse with the natives. After a friendly conference, with an interpreter, of nearly an hour's duration, the Commodore was getting into his boat, when a savage, standing 4 yards off, treacherously fired a poisoned arrow at him, which struck him on the left side. The boats at once retired to the ship, and this good and valuable officer died eight days afterwards. The feeling of the service cannot be better expressed than in the words of Vice-Admiral G. Phipps Hornby, one of the Lords of the Admiralty. He says:—

"The most difficult part of Commodore Goodenough's work on the Australian station must have been to protect the natives of the South Sea Islands from the white men—some, I fear, our own countrymen—who proposed to gratify the prevailing lust for money by stealing and selling their fellow creatures. To effect this, small vessels have been specially fitted out to search among the islands for kidnappers. One of them a few months since visited Santa Cruz on that service. She was attacked, or threatened with attack by the natives, and, in defending herself, inflicted severe loss on them. Such a mishap was not likely to establish that confidence on the part of the natives which it is the business of the Australian squadron to cultivate. If they can persuade the natives that the men-of-war are friends and protectors, their difficult duties will be much facilitated. To effect this it probably appeared to Commodore Goodenough that the most likely course was to attempt to open a friendly correspondence with them, and that it should be done without risk of misconstruction on the part of the natives—that an imposing force, and not a small schooner, should visit their island. For these reasons, I presume, he went in the largest ship of his squadron.

* See our number for February, 1875, p. 47.

But it must have been clear to him that to land armed to the teeth with the weapons of whose power the natives have had but too much experience, would not lead to any conference at all. The natives would simply retire into the bush. He had, therefore, no chance of gaining his object unless he landed unarmed. It is absurd to suppose that so clear-headed a man was not fully alive to the personal risk he ran; but it would have been simply a negation of his previous career if such knowledge had caused him to hesitate in doing the duty which was straight before him. There is no reason to suppose that he landed without an interpreter. If he had, it is difficult to understand how the 'satisfactory progress,' which the telegram reports, could have been made. His immediate object was to open friendly intercourse. The service will think he took the only means open to him to effect it, and, in attempting it, he received his death wound. Probably Commodore Goodenough was a man who did not attach much value to public opinion, but I believe he would be sensitive to that of his brother officers, and his last moments were, I trust, cheered by the knowledge that they would endorse his action. In one sense we must bitterly regret his death. We have lost a strong and trusted leader, on whom we reckoned in case of difficulties. But the manner of his death we do not regret. He has added one more name by it to the long roll of those who have made the reputation of her Majesty's Navy by looking only to see where duty lay, and by doing it at whatever cost. His reputation is, and ever will be, dear to us."

All honour to Admiral Hornby for coming forward to express the true feeling of the service and of the country on the brave and wise conduct of his brother officer, which led to his lamented death.

Commodore Goodenough died on the 20th of August 1875, and the funeral took place at Sydney on the 24th. The country has lost a true and faithful servant, accomplished, brave, and self-forgetting—a loss, whether the country knows it or not, which it will be long before it can replace.

Goodenough had always, especially since 1865, taken a deep interest in the efforts of his old mess-mates, Osborn and Markham, to promote the renewal of Arctic exploration. It was Captain Goodenough who induced Commander Markham (then a young lieutenant) to volunteer for Arctic service in 1865. He saw that such service was conducive to the interests of the navy, and, in the true interests of the navy, he continued to encourage our efforts by every means in his power. There are none in the naval service who will mourn the loss of their old captain more deeply than several of the officers of the Arctic expedition when, hereafter, they receive the sad news. Commander Markham, Lieutenant Parr, and Lieutenant May were his shipmates in the 'Victoria,' and loved him as they could not fail to love one who had trained them in the service with such affectionate solicitude. Lieutenant Rawson served under him in the 'Minotaur' and shares the same feeling; as does Mr. White, the engineer in the 'Alert,' another of his 'Minotaur' friends. The story of the loss of Commodore Goodenough is a mournful, but a most appropriate prelude to our account of the start of the Arctic Expedition.

THE ARCTIC EXPEDITION.

I.

FROM PORTSMOUTH TO THE WAIGAT.

WHEN the two Arctic ships left the dockyard and steamed slowly out of Portsmouth Harbour on that bright afternoon of the 29th of May, there was such proof that the heart of the English nation was stirred to its core as has seldom been given even on the news of a great victory—never before on the departure of an expedition of discovery. The ringing cheers from the yards and rigging of the 'St. Vincent' and 'Duke of Wellington,' taken up and repeated by hundreds of boats, yachts, and steamers, which surrounded and followed the ships across the waters of Spithead gave forth no uncertain sound. But the most imposing sight was presented by the shore line; from the dockyard gate to Southsea Castle. It was a dense mass of human beings. The garrison, which was drawn up on Southsea Common, presented one thin red line, fringing the vast crowd, collected from far and near, to witness the departure of the expedition. This sympathising crowd represented the feeling of the whole people of England, who have now shown, in a way which cannot be mistaken, that the spirit of maritime adventure and discovery is as dear to them as it ever was to their ancestors. The despatch of the Arctic Expedition is a great and wise measure, which has received the complete and hearty approval of the nation.

The 'Alert' led the way round St. Catherine's Point, followed by the 'Discovery,' with the 'Valorous,' having additional coals and stores, to be transhipped at Godhavn, bringing up the rear. A fair easterly wind carried the expedition down channel; on the 1st of June the ships anchored in Bantry Bay, and on the 2nd the 'Alert,' 'Discovery,' and 'Valorous' commenced the voyage across the Atlantic.







Officers and men had not been a day on board together before the 29th; but all soon settled zealously to their work, each, in his place, preparing to do his share and to help his comrades to the utmost. They are now far away in the wild unknown region, and it is well that we should have them all and each in our memory, with the part that each is taking in this great national enterprise. Captain Nares is a leader to whom all on board are warmly attached, an able and most careful navigator and surveyor, and an admirable organizer of details. He also has the experience of two Arctic winters, and of two seasons of sledge-travelling, in 1852-54. Commander Markham, besides the duties of commanding officer, has charge of the magnetic observations, of those relating to the polarization of light, and has studied and practised surveying. But his most important work will be the organization of the winter routines and amusements, and of the sledge-travelling, under Captain Nares. As regards the latter duty he has carefully studied all the details of Sir Leopold McClintock's system during the last two years; while his experience of ice navigation, acquired in 1873, is recent, and has been obtained in the light of all modern appliances. Captain Nares and Commander Markham are the only two officers of the expedition who had previously crossed the Arctic Circle.

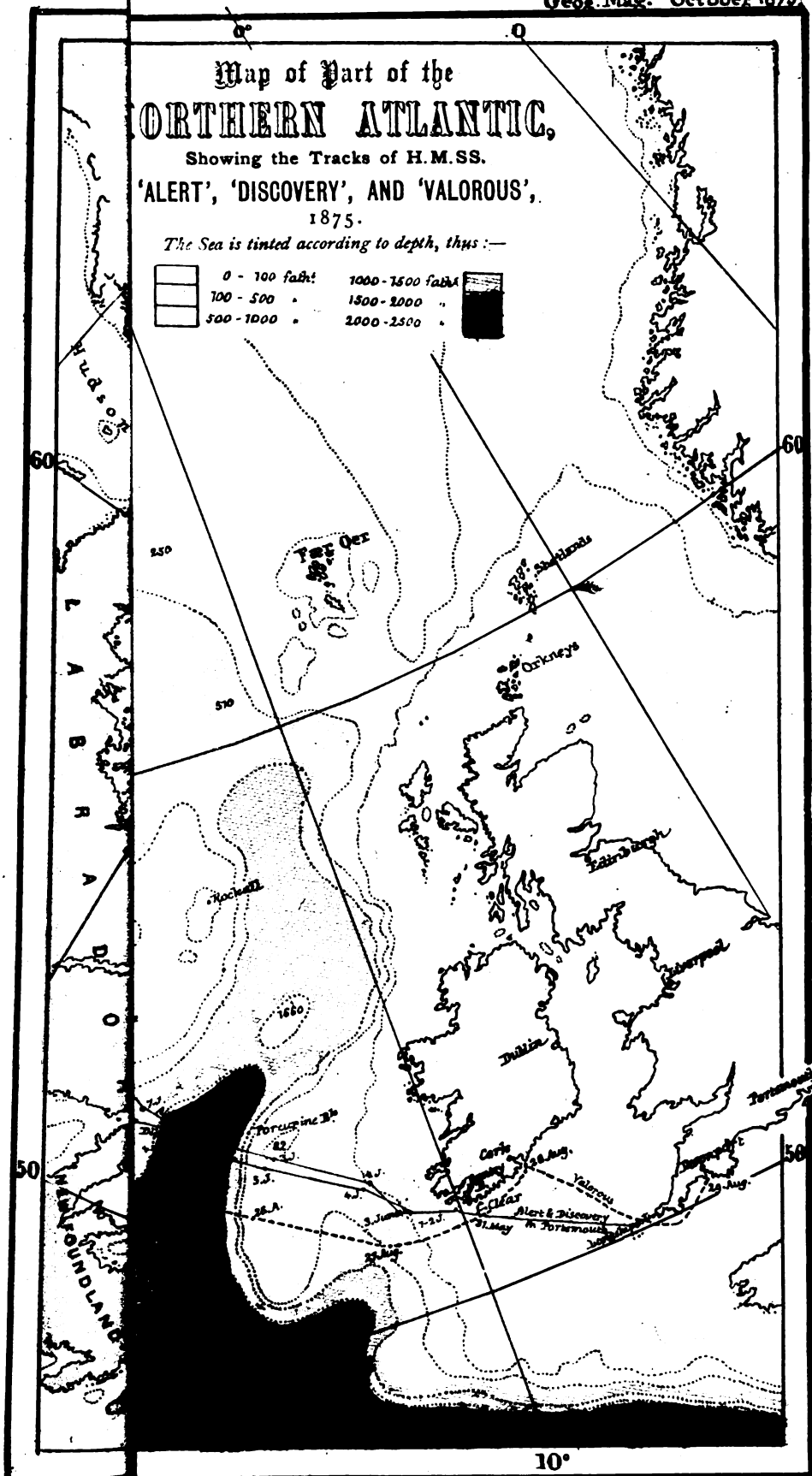
Lieutenant Aldrich is well versed in all matters connected with sounding and dredging, is a good

Map of Part of the NORTHERN ATLANTIC,

Showing the Tracks of H.M.S.S.
'ALERT', 'DISCOVERY', AND 'VALOROUS',
1875.

The Sea is tinted according to depth, thus:—

	0 - 100 fath.		1000 - 1500 fath.
	100 - 500 "		1500 - 2000 "
	500 - 1000 "		2000 - 2500 "



E. G. Ravenst.

observer, an excellent officer, and the best of messmates. Lieutenant Parr, a gunnery officer of great ability, has charge of the astronomical observations, and of those connected with spectrum analysis. Lieutenant Giffard assists Commander Markham with the magnetic observations, and has charge of the printing; and Lieutenant May, besides the navigating duties, has also gone through a course of instruction in spectrum analysis. Sub-lieutenant Egerton, in addition to his regular work, has undertaken the important and responsible duties of paymaster, including the preparation of dépôts and all the calculations connected with provision and clothing supplies. All the executive officers, under Captain Nares, give close attention to the meteorological observations. Dr. Colan, the fleet-surgeon, fills a most important post. He watches over the hygiene of the ships, and the health of officers and men, registers all statistical data with careful accuracy, and is a good ethnologist. He will observe for the presence of ozone, and will take other observations of scientific value. Dr. Moss is an officer of high scientific attainments, more especially as regards the study of minute organisms, and is a practised microscopist. He is a good artist, and excels in the drawing and colouring of objects under the microscope. He is also the inventor of an admirable plan for procuring microscopic objects in sea water, by means of a siphon, at the entrance of which a few fibres of cotton-wool are placed. Captain Feilden, recently paymaster in the Royal Artillery, is a good ornithologist and had studied the birds of the Farøe Islands during a visit in 1872. He has also acquired much general scientific knowledge, is an excellent messmate, and a very valuable addition to the staff of the expedition. Mr. Wootton, the senior engineer, is an experienced officer; and the second engineer, Mr. White, is the photographer of the 'Alert,' and is an officer of resource and some inventive talent. To the above twelve officers, a chaplain has been added. Mr. Pullen, the chaplain, has studied botany, and has a good knowledge of the English flora.

Besides the officers, the complement of the 'Alert' is made up of 48 men. There are eight chief petty officers; namely, Joseph Good, the chief boatswain's mate, who was Captain Nares's coxswain in the 'Challenger'; John R. Radmore, the chief carpenter's mate; George S. Burrows, the ship's steward; Vincent Dominich, the ship's cook, a native of Gibraltar; Colour-Serjeant Wood of the Royal Marines, who is a photographer and assistant to Mr. White; and the three Scotch ice quarter-masters. Of these latter the oldest is John Thores of Peterhead, a harpooner; John Berrie of Dundee, was a boat-steerer in the 'Erik,' with Captain Walker; and David Deuchars of Dundee is an old shipmate of Commander Markham in the 'Arctic,' where he was a loose harpooner in 1873 and 1874.

The petty officers of the first and second class are eleven in number. Thomas Rawlings, the captain of the fore-castle, an old shipmate of Commander Markham in the 'Blanche,' is an excellent seaman and has the largest girth of chest of any one in the expedition, namely, 41½ inches. The other captain of the fore-castle is Edward Lawrence. The captains of the main-top are James Doidge, who has just passed a very creditable examination for boatswain, and Daniel Harley who was in the Ashanti expedition: of the

fore-top, Thomas Jolliffe and Thomas Stuckberry. Adam Ayles and John Simmons are second-class petty officers, doing duty as fore-castle men. Frederick Cane, the armourer, served in the Ashanti campaign, as did Robert Joiner the leading stoker, and John Hawkins is cooper and captain of the hold. Of the fourteen able seamen Alfred Pearce, William Ferbrache a native of Jersey, John Pearson, Thomas Simpson, Robert Symons (who is Lieutenant Giffard's assistant in printing), and William Malley, a signalman, who served in the Ashanti campaign and gave up his rate to join the expedition, are seaman-gunners. William Woolley, another signalman, also gave up his rate to join the expedition, as did William Lorimer, who had previously been a leading seaman. The others are George Cranstone a native of Edinburgh, James Self, William Marshall, Reuben Francombe, David Mitchell, and George Winstone a young lad—a nephew of Good the chief boatswain's mate—who also came from the 'Challenger.' The three stokers are W. J. Gore, John Shirley, and Edward Stubbs a native of York and a good blacksmith. Henry Mann is the shipwright, and George Norris, capenter's crew. Spiro Capato, the captain's steward, a native of Cephalonia, was with Captain Nares in the 'Challenger.' The ward-room steward, George Kemish, is an excellent man, an indefatigable worker, full of resource and ready to put his hand to anything; and W. F. Hunt is the ward-room cook. The marines are William Ellard, Thomas Smith, and John Hollins; and the gunners Elias Hill, George Porter, and Thomas Oakley, each being servant to two officers.

The average age of the officers is 31, of the chief petty officers 31, of the other petty officers 29, and of the able seamen 23. The average weight of the officers when the expedition sailed was 150 lbs., girth of chest 37 inches, capacity of chest 262 cubic inches, and height 5 feet 9 inches. Of the men the average weight was 147½ lbs., girth of chest 37 inches, capacity of chest 253 cubic inches, and height 5 feet 6¼ inches. These measurements were taken on leaving England, for comparison with similar measurements to be taken after the winter, and again after returning from sledge-travelling.

The 'Discovery,' commanded by Captain Henry Stephenson, has an executive staff of four lieutenants and one sub-lieutenant. The first is Lieutenant Lewis A. Beaumont, a gunnery officer, who, in addition to his duties as commanding officer, undertakes the navigating duties and has charge of the pendulum observations. In the latter work he is assisted by Lieutenant Wyatt Rawson. Lieutenants Archer and Fulford undertake the magnetic observations; and Sub-lieutenant Conybeare has received instruction in spectrum analysis. Dr. Belgrave Ninnis, besides his important duties as senior medical officer, undertakes the charge of the meteorology; and Dr. Coppinger is a geologist and naturalist. The engineers are Mr. Cartmel and Mr. Miller, and Mr. Thomas Mitchell, the assistant paymaster, is the photographer, and is also a good artist. Mr. Hodson is the chaplain, and Mr. Hart, a student of Trinity College Dublin, has a knowledge of botany.

The chief petty officers of the 'Discovery' are George W. Emerson the chief boatswain's mate, a native of Hull; Edward C. Heddy the chief carpenter's mate, George R. Sarah the ship's steward, George

Leggatt the ship's cook, Serjeant Wellington of the Royal Marine Artillery, and the three Scotch ice quarter-masters. Of the latter Alexander Gray of Peterhead has already wintered within the Arctic circle, and William Dougall of Peterhead and Edward Taws of Dundee were harpooners. The other petty officers are Frank Chatel and Thomas Simmonds, captains of the fore-castle, George Bryant, George Bunyan an old shipmate of Commander Markham in the 'Victoria,' James Cooper, George Stone, David Stewart, William Ward the armourer, James Shepherd the cooper, and Jeremiah Rourke the leading stoker. The able seamen are John E. Smith, Alfred Hindle, Thomas Chalkley, Michael Regan, John Hodges, Peter Craig, R. W. Hitchcock, Daniel Gerard, H. W. Edwards, James Thornback, John S. Saggars, and Benjamin Wyatt who has charge of the printing. Another able seaman from the 'Valorous,' named Paul, was added to the complement of the 'Discovery' at Godhavn. The stokers are Frank Jones, Samuel Bulley, and William K. Sweet. Henry Windser is carpenter, Jonah Gear the ward-room steward, and James Phillips, the ward-room cook, aged 20, is a native of York, and the youngest man in the expedition. The marines are John Murray, Thomas Darke, Henry Petty, and W. Waller, and the gunners John Cropp, Eli Rayner, and Wilson Dobia, a native of Selby near York.

The average weight of the officers of the 'Discovery' is 151 lbs., girth of chest 36½ inches, capacity of chest 257 cubic inches, and height 5 feet 8½ inches. Of the men the average weight is 148 lbs., girth of chest 36½ inches, capacity of chest 223½ cubic inches, and height 5 feet 6 inches. All the officers of the expedition are Englishmen, except the two medical officers of the 'Alert' and one of the 'Discovery' who are Irish. Besides the six ice quarter-masters, there are five Scotchmen and three Irishmen. All the rest of the men are English, of whom 22 are from the west country, 18 from Portsmouth and other places in Hampshire and Sussex, 7 from midland counties, 9 from London, 5 from the Isle of Wight and Channel Islands, and 6 from Yorkshire.

The ships were necessarily very heavily laden and deep in the water, and it was no easy matter to stow three years' provisions and coals in vessels where so large a space is occupied by the engine-room. The weight of the provisions on board the 'Alert' is 136 tons, of which 55,808 lbs. are liquids and 249,801 lbs. solids, besides 178 tons of coal. The provisions and stores of the 'Discovery' are on the same scale: the ships being nearly the same size. The 'Alert' is 751 tons, 160 feet long, 33.4 broad, 17 depth of hold, and 15 feet 7 inches mean draft: the 'Discovery' 668 tons, 166 feet long, 30 beam, 18 depth of hold.

Provisions on board H. M. S. 'ALERT.'

	lbs.		lbs.
Salt pork	17,100	Meat biscuit	1,100
Salt beef	17,100	Flour (raw)	26,000
Suet	1,050	" (kiln dried).....	27,750
Bacon	3,720	Split peas	4,160
Pemmican (sweet) ...	3,752	Oatmeal	84
Pemmican (plain) ...	3,800	Candles (8s)	2,850
Fine salt	144	" (24s)	750
Chocolate (ordinary)...	2,950	" (signal)	50
" (soluble) ...	650	Boiled beef	6,372
Mustard	300	Cocoa-nut stearine ...	1,903
Pepper	140	Roast beef	6,480
Celery-seed	25	Boiled mutton	6,480

	lbs.		lbs.
Roast mutton	6,480	Pearl barley	112
Rump steaks	3,240	Oysters	250
Minced collops	3,240	Tapioca	56
Ox cheek & vegetables	4,260	Loaf sugar	224
Hotch potch	4,260	Sago	112
Onions	2,832	Cloves	3
Carrots	5,640	Nutmeg	3
Compressed vegetables	544	Sugar	12,250
Dried cabbage	544	Rice	112
Chilies	5	Tea	887
Culinary herbs	24	Tea (compressed)	112
Haddocks	100	Pickled garlic	25
Maccaroni	112	Biscuit	21,350
Condensed milk	192	Boiled bacon	2,240
Chocolate and milk ...	56	Tongues	180
Curry paste	50	Black currants } 18 bottles	
Baking-powder	100	Red "	51 gallons
Essence of beef	36	Vinegar	51 gallons
Normandy pippins ...	1,210	Lime juice	4,250 "
Preserved gooseberries	1,212	Safety matches	3½ gross
" rhubarb ...	1,212	Friction papers	500
Cocoatine	56	Candles	10,550
Pickled onions	777	" fighting	6,250
" walnuts	840	Soap	in 21 cases
" cabbage	816	Cavendish tobacco ...	596 lbs.
" gerkins	872	Shag	500 "
" piccalilli	777	Leaf	1,290 "
Preserved potatoes ...	6,050	Rum	1,366 gallons
Extract of meat	25	Port wine	29 "
Egg powder	14	Sherry	27 "
Preserved fowl	250	Brandy	28 "
Calves-foot jelly	24	Gin	30 "
Apple jelly	45	Whiskey	25½ "
Malt	400	Champagne	48 bottles
Hops	24	Allsopp's ale ...	10 hogsheads
Dog biscuit	4,690	Ground coffee	420 lbs.
Onion powder	50	Methylated spirits, 46 gallons	
Raisins	1,058	Mustard-seed	16 lbs.
Arrowroot	59	Cress-seed	9 "

It had evidently been expected and anticipated that a fair passage would be made across the Atlantic, for the ships were in their heavily laden condition, with small complement, and jim-crack inventions aloft for saving labour, but ill adapted for encountering bad weather. Heavy skids are built over the quarter-deck, on which were placed three of the largest boats, besides planking, sledges, and other gear. The boats on the skids were the yawl (10 oars double banked, with a dipping lug, foresail, and mizen, length 25 feet, breadth 6 feet 6 inches, depth 2 feet 5½ inches, weight 1250 lbs.), and two ice-boats (6 or 8 oars double banked, built to go on sledges; of cedar and elm carvel and diagonal, with sheet copper on the bows, 20 feet long, 6 feet wide, 2 feet 6 inches deep, weight 739 lbs.). And there were six boats at the davits, three on each side. The cutter was at the starboard quarter-deck davits (8 oars doubled banked, length 23 feet, breadth 6 feet 2 inches, depth 2 feet 4 inches, weight 1014 lbs.), a smaller ice-boat (15 feet long, 4 feet 6 inches wide, 2 feet 1 inch deep, weight 493 lbs.), three whale-boats beautifully constructed but very fragile, two of which were completely fitted for whaling (4 oars single banked, length 25 feet, breadth 5 feet 2 inches, depth 2 feet 3 inches, weight 717 lbs.), and a small punt (length 12 feet, breadth 4 feet, depth 1 foot 10 inches, weight 224 lbs.); besides Mr. Berthon's collapsible canvas coracle (weight 56 lbs., length 6 feet, width 3 feet 6 inches, depth 1 foot 4 inches).

The 'Alert's' engines are of the horizontal direct-acting type, with two compound cylinders, and surface condenser. Although only 60 H.P., they are capable of developing 570 H.P. when working at full power. The two boilers are cylindrical with return tubes, and there are two furnaces to each. The propeller

(Griffiths), with two blades, having a diameter of 10 feet and pitch of 8 feet 6 inches, is fitted without any framework, and is raised by means of a purchase that is hooked to a hole in either fan. The shaft is on the telescopic principle, and is withdrawn from the boss by means of a ratchet and pinion. The number of revolutions obtained at maximum speed, at the trial, was 120; and a distance of 22 miles was attained at a consumption of one ton of coal. The mean speed over the measured mile 7.684, and the consumption of coal per hour was 778.28 lbs. or 2.48 lbs. per T.H.P. per hour. The indicated H.P. 313.36 and nominal 60. The engines were manufactured by Messrs. Hawkshaw, of Newcastle, for the gunboat 'Cygnet' in 1874, and trashed to the 'Alert' in March 1875. There is a steam winch on the upper deck.

For the first day or two, after leaving Bantry Bay, there was a fair prospect of a good passage, but on the 4th of June it began to blow from the west; and during the whole voyage the expedition encountered contrary winds with very heavy weather. No Arctic expedition on record has had so long or so boisterous a passage across the Atlantic; yet this was not without its countervailing advantages. All the gear aloft was thoroughly tried, all things below were shaken into their places, and the men, amidst discomfort and hard work, more quickly formed that brotherhood upon the strength of which so much depends. Their appreciation of the nature of the service, and general good feeling was shown by many little things. For instance, on the 1st of June the petty officers came aft, and requested to be allowed to take their turn at the wheel, with the rest of the men. Sea boots and fur caps were served out during the first week, and in the forenoons every man comes on deck to drink his ounce of lime-juice, which is of excellent quality. The scale of diet for each man is 1 lb. of biscuit every third day, and 1 lb. of flour for bread on each of the two intervening days: every other day 1 lb. of corned-beef or corned-pork alternately; and on the intervening days $\frac{3}{4}$ lb. of preserved meat and $\frac{1}{4}$ lb. of salt meat: every fourth day 1 lb. of compressed vegetables, and on the others $\frac{1}{4}$ lb. of preserved potatoes: $\frac{1}{2}$ lb. of preserved soup every fourth day: $\frac{3}{4}$ lb. of flour, suet, and raisins every fourth day: $\frac{1}{4}$ lb. of split peas every fourth day, with $\frac{1}{2}$ oz. of celery-seed to every 8 lbs. of peas: 1 oz. of chocolate, $\frac{1}{4}$ oz. of tea, 1 $\frac{1}{2}$ oz. of sugar, 1 oz. of lime-juice, with 1 oz. of sugar for lime-juice, 1 oz. of pickles, and $\frac{1}{4}$ gill of rum daily: $\frac{1}{2}$ oz. of mustard, $\frac{1}{4}$ oz. of pepper a week, 2 ozs. of preserved fruit, and $\frac{3}{4}$ oz. of sugar for fruit twice a week; and oatmeal, vinegar, and salt as necessary. It is intended to add $\frac{1}{4}$ lb. of preserved meat on salt-meat days, so as to give some fresh meat every day. For the salt beef is hard, dry, and very bad, and it enters but too largely into the scheme of diet.

The bad weather began on the 11th of June, when the north-westerly wind increased to a gale, with occasional violent squalls, and the 'Valorous' parted company to make the best of her way to Godhavn. On the 12th it fell calm with a heavy swell, but on the 13th all three ships encountered a gale of unusual strength, undoubtedly portion of a cyclone travelling rapidly to the eastward. The 'Alert' was steering north in the south-east side of the circular storm, the vortex of which was moving to the north-east. The wind was consequently from the north-west, freshening

rapidly with violent squalls and a high confused sea. At noon the latitude was 53° 41' N. and longitude 23° W. In the evening it was blowing a whole gale, barometer falling rapidly. Green seas were coming in fore and aft, and both ward-room and lower deck were flooded. She was evidently very close to the vortex of the storm, and at 10 P.M. the barometer had fallen to 28.82. At the same time the ship was wore, and took in a green sea over the stern. Almost simultaneously the wind shifted to the north, showing that the 'Alert' had been within a very short distance of the vortex, and that she was now on its western side. The barometer began to rise again, but the gale from the north continued through the night. The fowls were all drowned, and the sea was washing about in the ward-room, where, after midnight, an enthusiastic naturalist might have been seen fishing for new organisms out of his cabin, with a hand-net. But they proved to be buckwheat washed out of the hencoops. More serious damage was done by the storm on deck. The skids, with the boats on them, worked very heavily, and the whale-boat, hoisted up to the davits on the starboard side, was stove in and destroyed. On the 15th the wind gradually died away to nearly a calm; but on the 17th there was another gale of wind from the west-north-west with a heavy sea, the ship lying to, and drifting to leeward. On the 20th the gale continued, heavy seas coming in over the fore-castle and washing fore and aft, and the cutter was nearly lost, being caught by a sea and half filled. A succession of gales with heavy seas continued until the 27th, when the 'Alert' was at length to the westward of Cape Farewell, and making for Cape Desolation on the west coast of Greenland.

It was on the 27th of June that the first ice was seen, a sight which was new to most of the explorers, and which gladdened their hearts. Mr. Egerton was officer of the watch, and, charging a formidable block, he was the first to make the ship touch ice at 5 P.M. On the 28th the 'Valorous' was sighted, and the land round Cape Desolation, lofty snow-covered ridges and peaks with clouds hanging over them. This land is the most interesting in Greenland. For here the old Norse colonies were planted, and this coast was first touched at by Sir Martin Frobisher, who named it "Charing Cross," and afterwards by John Davis, who gave it the name of "Desolation."

During the following week the ships passed close along the Greenland coast, sighting all the peaks and headlands and entrances to fiords; which excited much interest on board. The officers of the expedition were most anxious to acquaint themselves with the history of Greenland and of its inhabitants, a land which forms, as it were, the basis of their own future discoveries further north. But this natural desire for information could not be gratified, owing to an oversight in not supplying a proper Arctic library for the use of the expedition. There are about 70 Arctic books that ought to be available for reference, of which only 40 have been supplied; while the missing works include all those relating to Greenland, such as Fabricius, Hans Egede, Crantz, Graah, Rink, Kleinschmidt, Janssen, Trevelyan, and the vocabularies specially prepared for Arctic expeditions by Admiral Washington. The complete sets of volumes presented by the Hakluyt Society make up for some of the deficiencies, as regards the earlier Arctic voyages,

and a few others can fortunately be supplied from the private libraries of the officers.

On June 29th, from daylight until 10 A.M., the 'Alert' was passing through a stream of very heavy floe-pieces, and sustained several severe bumps which brought the ship up all standing. Some of the pieces were 200 or 300 yards long, others were fragments of pressed up hummock-ridges from 30 to 40 feet high. Many were worn into fantastic and beautiful shapes, the wash of the sea having frequently worked laterally into the ice-blocks until they consisted of two floors connected by ice-pillars of the deepest blue. This old ice was streaming round from the east coast of Greenland with the current which is usually lost or deflected again near the Arctic circle. The ship was clear of the ice before noon, and on the following night a gale of wind came on, and a very heavy confused sea with high perpendicular waves, which made her roll gunwales under and ship seas over the stern and fore-castle. Everything began to fetch way, a tremendous sea came down into the ward-room, the masts laboured heavily, and there were several leaks from the upper deck. The 1st of July was a lovely day, and in the afternoon the 'Discovery' was sighted about 10 miles in-shore. She had parted company during the cyclone of June 13th, had experienced the same weather, and had shaped almost the same course, but was actually in the ice during the gale of wind of June 29th.

The long succession of heavy gales has tried the gear of the ships, and has left various marks. Two valuable whale-boats have been stove-in and destroyed, one in each ship. In the 'Alert' the iron main-truss, the patent wire rudder-chains, and the chain ties of both topsail halliards were carried away; and the iron try-sail masts were started on all three masts. The patent gear on the foretopsail-yard was of bad iron, and the span connecting the spindle at the end of the reefing boom with the yard also carried away. The yard could not be shifted, as not a burton nor a sail tackle had been supplied, and there was no tackle long enough to send a topsail-yard down. All night, during the gale of the 29th, Kane the armourer and Stubbs the blacksmith were at work in the engine-room forging a new iron span for the topsail-yard, with the water washing up to their knees; for it is one great disadvantage of having placed the engine-room so low in the ship, almost on the flooring, that it becomes flooded during every gale of wind.

After the 1st of July the 'Alert' and 'Discovery' proceeded up the coast in company, passing Sukkertoppen on the 3rd, Holsteinborg, with all its dangerous outlying rocks and reefs, on the 4th, and the grounded icebergs off Rifkoll on the 5th; and on the morning of July 6th the 'Alert' and 'Discovery' anchored in the harbour of Godhavn or Lively, at the south-west end of the island of Disco, where the 'Valorous' had arrived on the previous Sunday evening, July 4th. Godhavn is the principal Danish colony of North Greenland, and the residence of the Inspector, Mr. Krarup Smith, as well as of Mr. Elborg, the Governor.

The island of Disco is, in several respects, an excellent locality for acquiring a first impression of the Arctic Regions and of their flora and fauna, while the geology presents points of special interest. It is here that the volcanic formations overlie the gneiss, and the basalt presents sections in some of the ravines

which were carefully studied; especially one described by Giesecké in a deep gorge above Englesmanders Havn, where the layers of columnar basalt and amygdaloid with mesotype may be seen resting on the gneiss. The points were noted where the gneiss formation disappears, near Fortune Bay on one side, and two miles from Godhavn on the other, and the mineralogy both of the basaltic and gneissose rocks was carefully observed. Here also there were special advantages for studying Arctic physical geography, the effects of frost and ice upon the rocks, the influence of summer rivers, the glacial phenomena, and those connected with the formation, drift, and breaking up of icebergs. From the summits of the Lyngmarkens-fjeld, 2300 feet above the sea, which overhangs the harbour of Godhavn, there is an enchanting view of Disco Bay, dotted with hundreds of bergs, and the fiord of Jacobshavn with its great discharging glacier, whence the icebergs were drifting in a continuous stream, was clearly visible. The Arctic officers eagerly examined and studied these phenomena, climbing the treacherous basaltic mountains, exploring the wild gorges, and crossing the flooded torrents. Icebergs were visited, as well as the coast at Ovivak, whence the Swedes carried off the now famous meteoric stones in 1871.

The valleys and gorges of Disco, especially the Lyngmarken and the shores of Englesmanders Havn, in their gay summer clothing of mosses and wild flowers, furnish an excellent example of the flora of both North and South Greenland, both of the plants which will become familiar to the explorers further north, and of the less hardy species which do not occur beyond this parallel. Of the 206 species which compose the Arctic Greenland flora, upwards of two-thirds were collected by the officers of the expedition round Godhavn, and they were thus enabled to form a practical acquaintance with the plants they are likely to meet with in the unknown region. The vegetation covers the ground in thick masses, forming turf on the level places, while it fills the chinks and crannies of the rocks, and creeps over the surface of the stones, giving a very bright appearance to the near view of this land of Disco in summer. The prettiest thing of all, and the most abundant, is the club-moss (*Cassiope tetragona*) with its graceful little white bell-flowers, like miniature lilies of the valley. With it are generally the dwarf willows and birches, and the *vaccinium* with its red flower and glossy little leaves. But for the plague of mosquitos these soft masses of vegetation would form most luxurious beds. The *Alchemillas*, the *Angelicas*, and whortle berries in the Lyngmarken, and the rich masses of holly fern in Englishman's Bay, will not be seen further north. But with them are many true polar flowers—the erect red blossom of *Pedicularis lapponica*, and the yellow, tinging to orange, of another species *P. flamma*; the bright little saxifrages red and white, *S. oppositifolia* and *cæspitosa*, the lovely *Dryas octopetala*, the familiar dandelion, the buttercup-like *Potentilla nivea*, the rather scarce *Ranunculus hypoboreus* with its yellow flower, the tiny white *Draba alpina*, the specially Arctic poppy, *Papaver nudicaule*, the *Silene acaulis* with its pretty little purple flowers level with beds of moss, the sweet-smelling *Ledum palustre*, and the showy purple blossoms of the *Epilobium alpinum*. Quantities of red snow were also found on the heights above Godhavn, and specimens were

carefully collected and preserved. Here too were the salad-supplying plants, the sorrel and scurvy grass, and many others. The herbaria formed at Godhavn will be most useful to the explorers, in studying the botany of the unknown region.

Disco is also a specially good locality for commencing the acquisition of a knowledge of the polar fauna; for here the Arctic and the sub-Arctic forms meet. Great northern divers, razor-bills, puffins, harlequin ducks, mergansers, skuas, wheat ears, pipits, and some phalaropes and sandpipers are seen at Disco, and not further north. At the same time the officers of the expedition here became acquainted with most of the true Arctic birds—the falcon (*Falco candicans*), the wheatear (*Saxicola œnanthe*), the two species of snow-bunting and their eggs (*Plectrophanes nivalis* and *laponica*), the raven (*Corvus corax*), the ptarmigan (*Lagopus rupestris*), the red phalarope (*Phalaropus fulicarius*), the purple sandpiper (*Tringa striata*), the Arctic tern (*Sterna hirundo*), the kittiwake (*Rissa tridactyla*), the glaucous gull (*Larus glaucus*), the skua (*Stercorarius parasiticus*), the fulmar or malleoke (*Procellaria glacialis*), the dovekey (*Uria grylle*), the loom (*Alca arra*), the red-throated diver (*Colymbus septentrionalis*), the cormorant (*Phalacrocorax carbo*), the long-tailed duck (*Harelda glacialis*), and the king and eider ducks (*Somateria spectabilis* and *mollissima*); as well as with the eggs of many of them. Dr. Moss had examined many organisms brought from the surface water of Davis Strait, and the contents of a dredge containing molluscs, holotheria, and crustacea from 30 fathoms on the Torske bank; and he had made careful coloured drawings of all the microscopic organisms that were new to him. With reference to the scientific labours of the expedition, Captain Nares issued a very judicious memorandum to Commander Markham and the other officers, at Godhavn. In order to render the scientific results of the expedition as valuable as possible, he expressed reliance upon the co-operation of each member to assist in forming and preparing natural history collections. While the most important specimens will be required hereafter for the general national collection, any supplementary collection will, after a proper inventory is made of it, for publication in the general account of the voyage, be at the disposal of the collector. Any paper or description composed for the information of any learned society will be forwarded to its destination, through the Secretary of the Admiralty, by the earliest opportunity as an original paper by the writer.

Commander Markham and Lieutenants Giffard, Archer, and Fulford, were fully occupied with magnetic observations during several days, obtaining satisfactory independent results for dip and variation; and Captain Nares with Lieutenant May fixed the position of Godhavn, and made a survey. Other instruments were also tried, while Mr. White and Mr. Mitchell got to work with the photography, and obtained seven excellent negatives.

The Arctic Expedition was at Godhavn from the 6th to the 15th of July, busily engaged in filling up with coals and provisions from the 'Valorous'; and receiving most hearty and cordial assistance from her captain and officers. The 'Alert' had 178 tons of coal on board when she left England, and had expended 44 in steaming, condensing, and cooking

before reaching Godhavn. She had condensed 36 tons of water with 6 tons of coal. She thus had 136 tons left, and received 66 from the 'Valorous,' making a total of 200 tons. Of this 114 tons is steaming coal, sufficient, with an expenditure of 4 tons a day (the quantity required for a rate of 5 knots an hour) for 29 days' steaming. The rest, 86 tons, is for cooking and warming. The additional provisions from the 'Valorous' were taken in:—

Salt beef	3000 lbs.	Preserved beef	6372 lbs.
Salt pork	3300 "	Preserved carrots ...	1656 "
Boiled bacon	2240 "	Rum	784 gal.
Sugar	4000 "	Flour	18,000 lbs.
Peas	2240 "	Biscuits	5500 lbs.
Dog biscuit	4000 "	Candles	16,800
Lime juice	1400 "	Sperm oil	30 drs.

The 'Alert' also received much gear from the 'Valorous,' and two boats, a four-oared whale-boat, and a jolly-boat with oars complete, besides the little canvas coracle belonging to Captain Loftus Jones, which will prove very useful in sledging operations.

The 'Discovery' then filled up, and there was nothing that the officers of the 'Valorous' were not ready to supply, from a topmast to a harmonium. On completing this work, Captain Nares addressed an official letter to Captain Loftus Jones, expressing his warm appreciation of the obliging assistance the expedition had received from the 'Valorous,' and specially thanking Mr. Eyre the first lieutenant, Mr. Gain the paymaster, and Mr. Coade the chief engineer.

Mr. Krarup Smith, the Inspector of North Greenland, and Mr. Elborg, the Governor of Godhavn, were most anxious to furnish all the aid in their power. They had received orders from the Danish Government respecting the supply of dogs, and 24 good Greenland dogs were ready for embarkation at Godhavn and 20 at Ritenbenk. Mr. Krarup Smith also supplied the expedition with a large net for catching white whales. The 24 Godhavn dogs were taken on board the 'Alert,' besides 9 sheep from the 'Valorous'; and at 4.45 P.M., of Thursday the 15th of July, the Arctic Expedition left Godhavn with the intention of going up Disco Bay to Ritenbenk, passing down the Waigat between Disco and the Noursoak Peninsula, and thence onwards to Upernivik. The 'Alert' proceeded with the 'Discovery' in tow, and Mr. Krarup Smith on board, followed by the 'Valorous.' The crows' nests were in their places, and the boats (no longer on the skids as when crossing the Atlantic) were all hoisted up to davits.

The surface of Disco Bay was like glass, and was dotted over with icebergs of great size and most fantastic shapes, while to the left rose the basaltic cliffs forming the south shore of Disco, resting on the yellow sandstones of the miocene period, which contain coal. At midnight of the 15th the 'Alert' passed close under the landward face of a magnificent iceberg, a cliff of dazzling white, the top of which was covered with *mollies*, which flew up in a great cloud. On the other side the berg rose to a peak 200 feet high, under which there was a grand arch, the inner sides being of a deep rich blue. The sea was smooth as glass, and the sky, seen through the arch, was crimson tinged with gold. As this scene of wondrous beauty presented itself, the 'Valorous' hove in sight through the arch, her dark hull and tall masts standing out against the

brilliant sky. In another hour there was a dense fog, which cleared away towards morning, disclosing a fine panoramic view with glassy sea and cloudless sky. On the left were the high basaltic rocks of Disco with the opening of the Waigat full of icebergs, ahead the lofty mountains of the Noursoak Peninsula, and to the right the gneiss cliffs and precipices of Arve Prins Island.

Passing the settlement of Ritenbenk the expedition anchored in a deep fjord extending up to the foot of the central chain of Arve Prins Island. The 'Discovery' here received her 20 dogs, good serviceable animals. Neil Christian Petersen was engaged as dog-driver in the 'Alert' and came out from England. He is a Dane aged 36, who had been cooper at Upernivik and served in the expedition of Dr. Hayes in 1860-61. An Eskimo named Frederik was engaged at Godhavn, as second dog-driver, and came on board with his kayak and the dogs at Godhavn. It was intended to try and engage the Eskimo Hans, then settled at Proven, who was in all three American expeditions up Smith Sound, as dog driver for the 'Discovery.'

During the afternoon of the 16th, Commander Markham, with Lieutenant Parr, Mr. Egerton, and Dr. Moss, took a party of men in two boats to Svartefugle Bay, on the north-west coast of Arve Prins Island, where there is a "loomery," and succeeded in bagging 75 looms, dovekeys, and razor-bills,* sufficient to supply officers and men with excellent fresh meat for two days. Other officers were away fishing, and exploring the islands.

The 'Valorous' was to sail at 4 the next morning, and proceed to the Ritenbenk Kulbrud, on the Disco shore of the Waigat, to coal; and the discovery ships were to follow two hours later. The 16th of July was, therefore, the last day on which the gallant explorers would see any of their countrymen. At midnight the captain and officers of the 'Alert' assembled in the ward-room to bid farewell to one who had been their messmate thus far, and who was the last Englishman whose hand they would grasp for many a long day. Healths were drank in bumpers of champagne, three hearty cheers from officers and men sent their echoes over the fjord, and their last-seen friend was pulled on board the 'Valorous,' at one in the morning of July 17th, by the four lieutenants—Aldrich, Parr, Giffard, and May, with Commander Markham at the steer-oar.

The 'Valorous' sailed from Ritenbenk at 4 A.M. of July 17th, the 'Alert' and 'Discovery' following; and at 8 A.M. the Arctic ships could be made out from the stern of the 'Valorous,' with their mast-heads and yards showing above the icebergs. At 1 P.M. the 'Valorous' anchored off the coal-bearing cliffs, on the Disco shore of the Waigat. From the hills there was a magnificent view of icebergs streaming out of the Tossukatek Fjord, at the head of which there is a great discharging glacier, and down the Waigat, and among them the Arctic ships could be seen, over on

the Greenland side of the strait, under all plain sail. They were standing down the Waigat (the 'Alert' leading), appearing and disappearing behind the huge icebergs, about 6 miles off. At 5 P.M. the 'Valorous' hoisted a signal at all three mast-heads—*Farewell! Speedy return!* It was not seen for a long time, but at last the 'Discovery' hoisted *Thank you*, and afterwards the 'Alert' ran up the affirmative pendant. They continued to stand on, and were just about to disappear behind a point of Disco Island, when, at 6.15 P.M. the 'Alert' hoisted a signal to the 'Discovery,' *Do you wish to communicate?* A few minutes afterwards the 'Alert' went about, apparently intending to beat up to windward and communicate with the 'Valorous'; and at 6.30 P.M. she hoisted a second signal to the 'Discovery'—*Optional, beat to windward.* Then a fog suddenly sank down on the water, and hid both ships from view. Supposing that they were beating up to her anchorage, the 'Valorous' went on blowing the steam fog-horn every ten minutes; but when the fog rose again towards morning, the 'Alert' and 'Discovery' were nowhere to be seen. When the fog came on, the intention of communicating must have been abandoned, and the Arctic ships must again have stood down the Waigat, and proceeded on their way to Upernivik. May all success and prosperity go with that gallant band of dauntless explorers!

(To be continued.)

II.

THE CRUISE OF THE 'VALOROUS.'

IN selecting a vessel for the duty of filling up the Arctic Expedition with coals and provisions at Godhavn, a strange choice was made. The 'Valorous,' an old paddle-wheel steamer of 1200 tons, was commissioned by Captain Loftus Jones at Devonport, in February 1875; with a very young ship's company, having an unusually large proportion of boys and ordinary seamen. Although a paddle-wheel steamer must inevitably lose her paddles in pack ice, and is quite unsuitable for service in the Arctic Regions, the 'Valorous' was ordered to proceed up Davis Strait, where ice is sure to be met with, and to visit a narrow strait which is more encumbered with icebergs than any other part of the Greenland seas. She was also to perform a special duty, in addition to her chief work connected with the expedition. Her orders were, after taking leave of the Arctic ships, to fill up with coal in the Waigat Strait, and then to carry a series of deep-sea soundings and dredgings down Davis Strait and across the Atlantic. Her instructions were to take a few dredgings on a line from Disco to the latitude of Holsteinborg, and 8 deep-sea soundings between the latitudes of Holsteinborg and Cape Farewell, the 3rd and 8th with serial temperatures, the rest only with surface and bottom temperatures. Then twelve soundings were to be taken across the Atlantic, between 60° and 57° N. latitude, ending at 20° E. longitude, in the space between the line of soundings taken by Sir Leopold McClintock in the 'Bulldog' in 1860, to the north, and those on a great circle between Valentia and Newfoundland, taken by Captain Dayman in the 'Cyclops,' in 1857, to the south. The 1st, 3rd, 5th, 7th, 8th, 10th, and 11th were to be soundings with bottom and surface temperatures, and the 2nd, 4th,

* It is interesting to find the looms and razor-bills breeding together at this point (*Alca arra* and *Alca torda*). Further north the latter are not met with. A young cormorant (*Phalacrocorax carbo*) was also obtained, with a curious malformation (one of its wings being wanting), and several eggs of the cormorant; besides numerous eggs of looms, dovekeys and razor-bills.

6th, 9th, and 12th were to be with serial temperatures. Dredgings were also to be taken when practicable, and Mr. Gwyn Jeffreys, with Mr. Herbert Carpenter as his assistant, went out in the 'Valorous' to examine the results of the dredgings. The necessary apparatus for deep-sea sounding and dredging was supplied.

Sailing in company with the Arctic ships, the 'Valorous' parted company on the 11th of June, encountered the same severe weather, and again sighted the 'Alert,' on the 28th of June, the day on which the heavy eastern pack was first met with, drifting round Cape Farewell and up the Greenland coast. It became necessary for this paddle-wheel steamer to pass through the formidable drifting ice; and Captain Jones, by the exercise of great care, and himself conning the ship from aloft, succeeded in bringing her through the pack without serious injury to the paddles. He prudently kept away to the westward with a view to getting clear of the ice, but a strong ice blink, indicating the near proximity of the middle pack, was seen away to the westward on the afternoon of the 28th, and the 'Valorous' was in no small danger of having to encounter risks to which such a vessel ought not to be exposed. Captain Jones is a careful officer, and a thorough seaman. In going to the north, he kept outside the 'Torske (cod) banks, and well away from the dangerous coast of Greenland, with its many unsurveyed outlying reefs and islets, and to avoid a rock near Disco the position of which is doubtful, he kept away close to the Whale Fish Islands, and arrived safely at Godhavn on Sunday evening the 4th of July.

The 'Valorous,' in going up, took 17 soundings between latitude $63^{\circ} 45'$ N. and Godhavn.

From the 4th to the 15th the officers and ship's company were actively engaged in filling up the 'Alert' and 'Discovery' with coals and provisions, and supplying the explorers with everything that forethought could suggest as likely to be useful. It was then necessary, as the 'Valorous' had become very crank after discharging all the stores, to get in ballast, and Captain Jones's intention was to remain at Godhavn after the expedition had sailed, and to get in the required quantity of ballast before proceeding to carry out the latter and less important part of his instructions. But Captain Nares expressed a wish that the 'Valorous' should accompany him as far as Ritenbenk, in order to enable him to finish his letters, a request to which Captain Jones of course readily acceded.

After accompanying the expedition to Ritenbenk, and receiving the mail-bags, the 'Valorous,' with Mr. Krarup Smith, the Inspector of North Greenland, on board as pilot, proceeded to Ritenbenk Kulbrud on the Disco shore of the Waigat Strait, on the 17th of July, anchoring off that exposed coast, in front of the coal cliffs, at 1 P.M. The cliffs are of shale and sandstone, with four horizontal seams of coal clearly visible from the ship. High above them there is a ridge of basaltic buttresses formed by the waterfalls pouring over their summits, and a steep green slope of spongy grass and mosses intervenes between the foot of the basalt precipice and the top of the coal cliffs.

The 'Pandora' was expected to arrive at Disco about the 20th of July, and Captain Allen Young had requested that, if possible, an arrangement might be

made for having a supply of coal ready for him on his arrival. Mr. Krarup Smith, on being applied to, very obligingly took prompt measures to ensure compliance with the request; and when the 'Valorous' arrived at the Ritenbenk Kulbrud, a party of Eskimo, with an old Danish overseer, had already been at work since Monday the 12th of July, digging out coal. Two tents were pitched on the cliff, a gang of rather pretty girls was digging away at one of the upper seams, and the men were fishing in kayaks, while another tent was pitched on the beach near the two large *umiaks* in which the women, tents, and provisions had come from a place on the Disco shore called Ujarasussuk. The Eskimos were clearing away the overlying shale, so as to lay bare a large surface of coal about two-thirds of the way up the cliff. Mr. Krarup Smith inspected the work, and, before taking leave and returning in his boat to the settlement of Ritenbenk, he said that 40 tons of coal would be ready for Captain Allen Young, as soon as the 'Pandora' arrived. We may, therefore, hope that the 'Pandora' will successfully reach the North Water of Baffin's Bay, visit the Cary Islands and Point Gale or Cape Isabella, and bring back welcome letters and the latest news of the Arctic Expedition in the autumn.

The lowest seam of coal, close to the beach, appeared to be the best, and here the working parties from the 'Valorous' commenced operations. It is a light coal containing bitumen, and it was found that 1 lb. of it boiled a gallon of water in 25 minutes, which English coal did in 18 minutes.

The strait between the island of Disco and the Noursoak Peninsula on the mainland of Greenland, is 80 miles long from Arve Prins Island to Hare Island at its outlet in Baffin's Bay, and 10 miles wide. At the north corner of Arve Prins Island there is a deep fjord separating it from the Noursoak Peninsula, with the great discharging glacier of 'Tossukatek' at its upper end. The glacier sends forth a constant stream of huge icebergs down the strait which the Dutch well-named the "Waigat" or blow-hole. The Danes call it "Waigattet," and the Eskimo "Ikareseksoak." A current generally flows down the Waigat into Baffin's Bay, which carries with it the whole of the icebergs from the Tossukatek glacier, and many from that of Jacobshavn; but the drift of the bergs is also influenced by the winds, which blow up or down the strait. The S.E. wind drives the icebergs over to the Greenland shore, while those from the N.W. bring them across to the Disco side. Dark mountains rise up on either hand. Those of Disco average a height of 3000 feet, while on the Greenland side the Noursoak Mountains are loftier, with mighty precipices, and serrated ridges and peaks.

It would be difficult to conceive a more precarious anchorage than that off the open coast of this ice-berg-laden Waigat. The best position that presented itself had been selected in front of the coal cliffs, which are in $70^{\circ} 3' 24''$ N. latitude, and about half way down the strait. At each end of the cliff, which extends for about 2 miles, there is a wide swampy delta formed by the drainage of the inland glaciers, off which shoals have formed. These shoals afforded some slight protection to the 'Valorous,' for the icebergs grounded on them, and remained aground until the heat and sea reduced their bulk and set them afloat again. Several bergs of enormous size were

thus aground, and in threatening proximity to the ship.

When the 'Valorous' arrived the mass of icebergs was on the Greenland side, the wind being from the south-east, but it was evident that a wind might spring up from the opposite direction at any moment, when the ice would come over, and the ship would be in a hazardous position, particularly if the weather was foggy. On Sunday, the 18th, Captain Jones sent the cutter across the Waigat with the Navigating Lieutenant, Mr. Broad, to ascertain whether there was safe anchorage at Atanekerdluk; the locality famous for the fossil miocene plants that have been found there by Dr. Walker, Dr. Brown, Professor Nordenskiöld, and others, and described by Professor Heer. It took five hours to beat across the strait, against a dead foul wind, amidst hundreds of icebergs and drifting berg pieces.

Atanekerdluk Harbour is formed by a mass of coarse-grained dolerite about a mile long, which is connected with the mainland of the Noursoak Peninsula by an isthmus of sand, forming a bay on either side, the northern bay being further protected by a basalt rock joined to the main by another spit of sand. The water in the north bay is very deep, and the entrance was blocked up with icebergs. The south bay, facing the stream of bergs, was entirely filled with ice. The mountains above Atanekerdluk rise abruptly to a height of 4000 feet, ending in sharp peaks, and the strata containing fossil plants consist of ferruginous clay 1200 feet above the sea. The deep gorges lower down show the geological section described by Brown and Nordenskiöld, shales with thin sand-beds and coal-seams belonging to the upper cretaceous period. The whole is crossed by vast dykes of eruptive rock, which are weathered out into distinct walls on either side of the ravines, about 10 feet broad. One basaltic pillar, called "Rink's Obelisk," stands on the face of the mountain, just over the harbour. Above, where the fossils are chiefly found, the formation is of the miocene period.

At 6 P.M. it came on to blow hard with rain, and threatening dark clouds were banking up across the Disco Mountains. The scene was indescribably grand and wild. An army of icebergs was drifting down the Waigat, and occasionally calving or turning over with a loud echoing noise. Some of them were of great height, with their pinnacles and summits, 300 feet high, peering up through the wild scud and mist. Now and then a gleam of sunlight brought out a peak of Disco range in bright relief. The wind carried the boat swiftly out of the harbour, with only the oars squared. Then a close-reefed foresail was hoisted, and she scudded before the squalls at a brave pace, breasting and dashing through the waves, while the white spray curled round her and flew from her bows. The spray also dashed wildly over the icebergs which were drifting down the Waigat, rising and falling on the waves, and occasionally coming into collision with a loud roar. It was no easy work to steer clear of them, so thickly were they crowded together, and once a shift of wind in a squall took the sail aback. It was a wild and dangerous passage, and the boat did not reach the 'Valorous' until near midnight. Neither Atanekerdluk nor any part of the Waigat are fit places for a paddle-wheel steamer.

In calm weather the scenery of the Waigat is,

however, very lovely. Icebergs rest quietly on the glassy surface of the sea, and the sharp serrated outline of the Noursoak Range stands out in clear relief against a bright golden sky, while the grand precipices of Disco have a ruddy reflection on them from the midnight sun. There is certainly no better place for studying the formation and movements of the icebergs, which can be seen drifting in hundreds out of the glacier discharging fjord, and floating in imposing masses down the strait, grounding and again afloat, calving with loud discharges, and breaking up with a noise like thunder. On one, with lofty peaks and much snow, a thin reddish band was observed running diagonally across and passing through the berg—being on both sides. These discolourations in bands are not uncommon. They must be layers deposited on the surface glacier by dirty running water, and, when seen on a berg, they show the angle at which it has fallen over. Again a line of clear sapphire blue is frequently seen to cross the white mass of an iceberg, which also passes through it and appears on the other side. When the berg breaks up, this transparent blue ice separates from the white opaque mass, and the two kinds may be seen floating on the sea, and washed up on the beach. When the berg was a portion of the mother glacier, a rivulet must have spread over the surface at one time and been frozen, forming the hard transparent layer of blue ice, afterwards snow has fallen and been compressed above it, and thus a blue line or a brown line, according as the rivulet was clean or dirty, is formed, which appears in the iceberg when it becomes detached. Off the Ritenbenk coal cliffs there is an incessant rumbling noise through the night, a combination of the roar of many waterfalls pouring over the basalt summits, of others dashing down the cliffs, of the grinding of ice on the beach, and of the calving of bergs in the offing.

At one part of the cliffs a dyke of white basalt has cut through the strata to the beach, and at the south-eastern end there is a mass of ferruginous clay, which contains many impressions of fossil plants of the upper cretaceous period. Beyond the cliffs is the delta two miles across, formed by the drainage of the interior glacier, which here breaks through the basaltic ridge and, in the course of ages, has entirely worn down the cliffs, grinding the sand to powder and scattering the coal over the plain and adjacent sea. The delta is traversed by numerous streams flowing from the glacier, and winding amongst great tufts of turf and boggy earth, covered with *equisetum* and dwarf willow. The delta presents a concave outline to the sea, formed of a ridge of sandy beach with a narrow backwater having tidal outlets between it and the swampy plain. The shores of the Waigat consist of cliffs alternating with these swampy deltas, and are quite different from the outline laid down on the chart.

The ship had been in constant danger from the bergs, and on Wednesday the 21st of July, a larger mass of ice than usual drifted down and made it necessary to get under weigh. The wind was shifting to the north, and the anchorage was no longer safe. During five days the men had worked admirably at the coal-seams, and, in 88 hours, they got on board no less than 105 tons. In the evening of the 21st the 'Valorous' steamed down the Waigat, and was off Hare Island, at the north end of Disco, the next

morning. She was not an hour too soon, for the wind had shifted round to the north with fog, which would have brought all the ice over to the Disco side of the Waigat, and the ship would have stood a good chance of being driven on shore.

The second and supplementary part of the work imposed upon the 'Valorous' now commenced, namely the dredging and sounding between Disco and the latitude of Holsteinborg. But it was also necessary to complete the work of getting in the ballast which had been broken off at Godhavn, and Captain Jones decided upon putting into Holsteinborg for that purpose. Godhavn would now be considerably out of the way, while Holsteinborg is clear of the east ice drifting from the south, and at the same time conveniently situated for commencing the deep-sea soundings on the parallel of 67° N., in accordance with the instructions.

The first deep-sea sounding and dredging in Baffin's Bay was attempted by Sir John Ross in 1818. He invented what he called a deep-sea clamm, consisting of a pair of forceps kept asunder by a bolt, and so contrived that, on the bolt touching ground, a weight slipped down a spindle and closed the forceps, which retained samples of the bottom. On September 1st, 1818, in 73° 37' N. and 75° 25' W., he sounded in 1000 fathoms and obtained a beautiful *Caput Medusæ* (*Asterophyton*) entangled on the line, the first animal that was ever brought up from such a depth. It is a very curious star-fish with long branching tentacles. In July 1871 the Swedish steamer 'Ingegra,' which brought home the meteoric stones found by Nordenskiöld at Ovikak, took soundings with surface and bottom temperatures off Upernivik and Svarte Huk, two off Disco, and 11 off the coast from Rifkoll to Cape Amalia, twenty altogether, but no deep-sea dredgings.

The first dredging of the 'Valorous' was a few miles north of Hare Island, at the mouth of the Waigat, in latitude 70° 35' N. But Mr. Gwyn Jeffreys had already dredged both in and outside the harbour of Godhavn, obtaining a good collection of the mollusca, crustacea, and other organisms; as well as off the Ritenbenk Kulbrud, with the interesting result that the bottom of the Waigat, though covered with glacial mud, is found to be rich in animal life. The arrangements for dredging on board the 'Valorous' were similar to those in the 'Challenger,' except that the work was done from the fore instead of the main-yard-arm. In sounding it is necessary to shorten and furl sails and have the ship under steam to keep her over the line. An iron pulley is placed on the fore-yard outside the boom iron, and a 4-inch hawser is rove through it to trice up the accumulator, which consists of 20 pairs of India-rubber bands $\frac{3}{4}$ of an inch in diameter, 3 feet long, and stretching to 17 feet, when they exert a pressure of 70 lbs. This arrangement takes off all strains on the dredge-rope, which might otherwise cause it to part. The bands are kept separate by being rove through holes in a circular disc of wood; at the bottom of which there is a 9-inch block with a patent sheave, and through it the dredge-rope runs. The dredge-rope, $2\frac{1}{2}$ -inch of the best Italian hemp, is coiled away in a rack or "sheep pen," abaft the mizenmast, and is marked as a sounding-line. It passes through the block at the end of the accumulator, and is then made fast to the dredge, the other end being brought to the donkey-

engine for heaving in. The dredge is an iron framework with arms connected together by iron screw-bolts, and between them there is an iron tongue with a swivel to which the rope is attached. On each of the long sides of the iron framework there is a broad piece of knife-edged iron, at an angle of about 10° from the perpendicular, to skim the surface off the bottom and throw it into the sack, which is made of net-work of soft line in very small meshes, and secured to the framework by lacing. The sack was covered with hides in which holes were pierced, to prevent it from being cut by rocks. An iron bar was secured to the lower end of the framework, to which a line of swabs was fastened, to entangle any animals missed by the dredge.

At 1 P.M. of July 22nd the dredge went down in 175 fathoms, and was brought up by the donkey-engine. It contained many organisms in very tenacious mud, and several splendid specimens of the *Asterophyton* (*Caput Medusæ* of Sir John Ross) were adhering to the swabs. There was a second dredging at 4 P.M. On the 23rd two dredgings were taken in the afternoon, with equally valuable results. But it was found that the long tentacles of the *Asterophytions* and other echinoderms got inextricably entangled in the thick swabs; so Captain Jones had some yarns of duck carefully frayed out and secured in a row to the bar below the dredge, which answered much better. On Saturday the 24th the 'Valorous' was in sight of Rifkoll, and over the Torske Bank, where there were 20 and 16 fathoms. Two very rich hauls of the dredge were taken in the afternoon, which brought up many echinoderms, including a great number of *Holothuria* and crustacea, among which was the curious *Caprella* or naked shrimp, and a good supply of molluscs of Arctic forms. Another dredging was taken on the 26th, in 60 fathoms.

On Sunday the 25th the ship was near the Knight Islands, a long reef placed on the chart just to the north of Holsteinborg; but the weather was foggy, and Captain Jones prudently stood out to sea, waiting for the mists to clear away. The 26th was also foggy, and the 'Valorous' continued to stand off the land, being about 40 miles from Holsteinborg, and to the southward at midnight.

The fog cleared away in the morning of Tuesday the 27th of July, and the 'Valorous' shaped a course to Holsteinborg, the current setting her rapidly to the north until, at 7 A.M., she sighted the outermost of the Knight Islands. According to the general chart the harbour of Holsteinborg is approached by an east course a mile or two to the south of these islands. There is also a special plan of the harbour, which was surveyed by Mr. Stanton, the master of the 'Phœnix,' in 1854; but it only shows the inner anchorage, and affords no information respecting the approaches. Captain Jones, after getting well clear of and 3 miles to the south of the Knight Islands, the only danger indicated on the chart, found himself 10 miles outside Holsteinborg and, so far as the chart or sailing directions informed him, in the fair way for the harbour. Feeling his way carefully in, he shortened sail, and, shaping a course nearly east, proceeded under steam at a rate of 4 knots. This speed was necessary to keep the ship under command, as there was a strong tide flowing to the northward, and setting against the ship's starboard bow. Ahead, at a distance of 5 miles,

there was a round island which was taken to be one shown on the plan with a beacon on it. Although several miles from the port, Captain Jones was on the point of stopping the engines, and sending a boat in for a pilot, when the ship struck on a sunken rock, at 9.15 A.M. At the time there were two leadsmen on each paddle-box, with leads constantly going, and a minute before the port leadsmen had got 17 fathoms. Most providentially the tide was rising, but the wind was freshening, and for the next hour the ship continued to bump heavily on the rocks, both ahead and under the engine-room on the starboard side. Captain Jones wisely determined not to back the engines but to wait for the tide to rise, and in the meanwhile the paddle-box boats were got out, anchors were laid out, and all necessary precautions were taken. If a gale had come on the danger would have been very great, but otherwise there was good hope that the ship would float at flood tide.

The cutter was sent away at 10.30 A.M., in charge of Lieutenant Wood, to ascertain the position of Holsteinborg, get a pilot, and give notice of the accident. There was a chop of a sea with a fresh breeze, and heavy fog hanging over the Greenland Mountains, though the Knight Islands were in sight to the north, and the round island, for which the cutter steered, was visible 5 miles to the east. On coming closer no beacon was to be seen, and it became a puzzle to know how to proceed, for the charts were evidently wrong and misleading. Hawling closer to the wind, to look round another island further north, three kayaks came in sight, containing Eskimos belonging to a party encamped on one of the islands (that called Marryatt Island in the plan, the proper name of which is Iglutalik) to fish for halibut. One named Gideon was at once sent off to the 'Valorous' as a pilot, while red-haired grinning Isak, and another guided the cutter through a labyrinth of islets and rocks to the settlement. It turned out that the round island was not on the plan or chart, while it intercepted the view of the island on which the beacon is placed according to the plan, called Fredrick VII. Isle, but the real name of which is Amertlok. There is no beacon, but only a flag-staff. Holsteinborg consists of five very neat wooden houses, a store, a church, and a dozen Eskimo habitations: the houses painted black or white with red roofs, the huts of stone with glass windows and wooden gable-roofs. The church dates from 1773, and the clergyman's house is a few years older. The population of the settlement, the native name of which is Sisimiut, is 201; and of the whole colony of Holsteinborg, including Sisimiut and eight other stations, 565. Holsteinborg stands on a patch of bright green turf surrounded by sombre masses of granite with a background of magnificent precipitous mountains, ending in a sharp peak called *Nususak* or "the top-knot," in Eskimo; and in Danish *Kærling-hetten*. It is improperly named Mount Cunningham on the Admiralty plan. The settlement is approached from the harbour by a little creek, with perpendicular gneiss rock on one side, and on the other an inner cove containing a schooner-rigged boat and several whale-boats. The harbour is very deep and protected by outlying islets, and opposite Holsteinborg fine masses of gneiss, with bright patches of green in the ravines, rise to a height of 2000 feet. It was here that the Holsteinborg settlement was originally formed, and the lofty

peak above the old site is called the *Præste Fjeld* from the famous priest and naturalist Fabricius, having climbed its almost perpendicular sides, and built a cairn on its summit.

Mr. Lassen, the Governor of Holsteinborg, with Johan Leonard, the pilot, at once came out in the cutter. Fortunately the wind had died away and the ship had floated off soon after noon. But she was making much water, and there was a serious leak near the fore-foot. She was piloted round to the south of all the unknown dangers, and safely anchored off the settlement of Holsteinborg at 7.10 P.M.

Mr. Lassen said that, owing to reefs and sunken rocks, not indicated on the chart, Holsteinborg could only be approached from the south. It so happens that ships always have come from the south, the 'Victory,' with Sir John Ross, in 1829, the 'Phoenix' and 'Breadalbane' in 1853, the 'Fox' in 1858, the 'Juniata' in 1873, and the annual ships from Denmark. But it appears that, between 1850 and 1860, a Scotch fishing schooner, approaching from the west, struck on this very reef. Mr. Lassen reported that, to the westward, there are three reefs at a distance of 9, 12, and 14 miles from the harbour, on the innermost of which the 'Valorous' struck; while further to the south, and 14 miles from the harbour, there are other rocks not visible above water. None of these dangers are indicated either on the plan or chart. On the 28th and 29th Captain Jones and Mr. Broad were occupied in making a survey of the approaches to the harbour. It was found that the Knight Islands, instead of running out from the land in an east and west line, as shown on the general chart, trend at a sharp angle to the south-west, that other islands were out of their places, and that several islands and rocks were not shown; while no warning of danger is either given in the sailing directions, or indicated on the plan. Practically it was a very dangerous and unsurveyed coast, and without reliable charts, no precautions can remove all risk in approaching it. Certainly the Captain of the 'Valorous,' throughout the voyage, was most careful and watchful in the performance of the difficult and hazardous service that had been entrusted to him.

At first the water made at the rate of 8 inches an hour, and the pumps were kept constantly going. The divers reported that several feet of the main keel and the lower part of the gripe were torn away or split, and that the garboard strakes on both sides were started. When the ship was docked, it was found that her injuries were even more serious, but it was also found that the divers had made a very good job of the temporary repairs. A strong bulkhead, as a coffer dam, was built at a distance of 12 feet from the stem, and 9 feet high and wide, fitting to the flooring, orlop deck, and sides, and forming a nearly watertight compartment to confine the main leak. The keel was drawn together by a clamp, and the garboards by 17 bolts driven through them, and into the dead wood, the whole being covered with lead sheeting and copper, which made all safe for crossing the Atlantic. A mizen trysail was thrummed, in case it should be required. The ship's company, composed mainly of mere lads, both at the coal-seam and at the weary pumps, worked well and cheerfully, and when the ship was on shore they showed energy, promptitude, and presence of mind. If ever men earned special reward for ex-

ceptional service, the young ship's company of the 'Valorous' have so earned, and well deserve the recognition they have since received.

The Holsteinborg region presents much that is interesting, especially as regards the difference between its flora and fauna, and those of the more northern parts of Greenland. The vegetation is richer, and flowers, such as *epilobium*, grow in great profusion, while bunches of sorrel and angelica are brought off for sale. The Knight Islands literally swarm with razor-bills, which take the place occupied by the looms in the far north. The plumage of the two species (*Alca arra* and *Alca torda*) is the same, and the only difference is in the bills, one razor-shaped, the other short and pointed, indicating the difference of food as the cause for the northern and southern habitats of the two birds. The razor-bill appears to live chiefly on the sea eggs (*Toxopneustes Dröbachiensis*), bits of the broken shells of which are scattered over the rocks. Glaucous gulls and kittiwakes breed on the Knight Islands. The handsome red-breasted merganser (*Mergus serrator*), and the harlequin duck (*Histrionicus torquatus*) are also birds common round Holsteinborg, which are not met with north of Disco. Eider and king ducks are abundant. There is a great fishery of rock cod, salmon, trout and huge halibut on the banks outside, and trout abound in the small lakes and streams. Edible scollops are procured from the rocks (*Pecten islandicus*), and among the crustacea were found the very curious little creatures which swim about on their backs in small ponds on the islands (*Apus glacialis* and *Branchipus paludosus*), and are well described by Fabricius. The former resembles the trilobite of Silurian times. They form the common food of ducks and divers. Mr. Gwyn Jeffreys and Mr. Carpenter were enabled to obtain four interesting dredgings, with the use of the Governor's boat, in 10 and in 30 fathoms.

On August 8th, the divers having completed their labours, the 'Valorous' sailed from Holsteinborg, and recrossed the Arctic Circle at midnight. Although, in her injured condition, it was necessary to return to England with as little delay as possible, Captain Loftus Jones was determined to do his utmost to carry out his instructions; and he succeeded in taking a most important line of soundings down Davis Strait and across the Atlantic, over previously untouched ground.

The four following soundings were taken down the centre of Davis Strait:—

<p>August 10th. Lat. 64° 5' N. Long. 56° 47' W.</p>	<p>410 fathoms— Surface temperature 41° Bottom " 36° The dredge brought up three molluscs (one a brachiopod) belonging to the Norwegian seas, but not previously known as Greenland species; also <i>Antipathes arctica</i>.</p>
<p>August 11th. Lat. 63° 9' N. Long. 56° 43' W.</p>	<p>1170 fathoms— Surface temperature 42° Bottom " 36°.18 The dredge brought up a <i>dentalium</i>, and many foraminifera.</p>
<p>August 12th. Lat. 62° 6' N. Long. 55° 56' W.</p>	<p>1350 fathoms— Surface temperature 45° Bottom " 35°.4</p>

<p>August 14th. Lat. 59° 10' N. Long. 50° 25' W.</p>	<p>1750 fathoms— Surface temperature 45° Bottom " 33°.8 The dredge brought up two minute crustaceans new to science, caprellæ, and a minute bivalve, besides other molluscs, siliceous sponge spicules, globigerinæ, and a rare crustacean (<i>Pourtalesia</i>)</p>
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The Atlantic soundings go over an unexplored area between the lines of the 'Bulldog' and 'Cyclops.' They are seven in number, as follows:—

<p>August 16th. Lat. 58° 14' N. Long. 46° 29' W.</p>	<p>1660 fathoms— Surface temperature 49° Bottom " 34°.27 Serial temperatures were also taken at every 200 fathoms.</p>
<p>August 17th. Lat. 57° 50' N. Long. 44° 52' W.</p>	<p>1860 fathoms— Surface temperature 53° Bottom " 33°.4 The dredge brought up globigerina ooze.</p>
<p>August 19th. Lat. 56° 11' N. Long. 37° 41' W.</p>	<p>1450 fathoms— Surface temperature 53° Bottom " 36°.2 Stony bottom. The dredge brought up stones, exquisite siliceous sponges, a brachiopod, and foraminifera.</p>
<p>August 20th. Lat. 56° 2' N. Long. 34° 51' W.</p>	<p>690 fathoms— Surface temperature 53°.5 Bottom " 38°.2 Black volcanic stones, Echinoderms, siliceous sponges, annelids.</p>
<p>August 21st. Lat. 55° 58' N. Long. 31° 41' W.</p>	<p>1220 fathoms— Surface temperature 55°.5 Bottom " 36°.76 Mud.</p>
<p>August 22nd. Lat. 55° 38' N. Long. 28° 42' W.</p>	<p>1485 fathoms— Surface temperature 54°.5 Bottom " 36°.56 Mud.</p>
<p>August 23rd. Lat. 55° 10' N. Long. 25° 58' W.</p>	<p>1785 fathoms—</p>

A gale of wind, with a very heavy sea, came on the 24th, and continued during the two following days, which put an end to further sounding, as by the 26th the 'Valorous' had reached known ground off the west coast of Ireland.

Besides performing her chief duty connected with the Arctic Expedition, the 'Valorous' has undoubtedly done much useful work during her cruise of three months to Greenland. The positions of several places in the Waigat, incorrectly placed on the Admiralty chart, have been accurately fixed. Holsteinborg has been surveyed and the dangers in approaching it have been laid down. No less than 57 soundings have been taken in Davis Strait and the Atlantic; and dredgings, which have yielded very important results, have been brought up within and outside Godhavn, in the Waigat, off Hare Island, on a line down the centre of Davis Strait, and in a previously unexamined part of the Atlantic. Several new forms have been discovered, but the most interesting results have reference to questions of geographical distribution of the Greenland and Norwegian marine faunas. The Atlantic soundings show that there is a "cap" or ridge, with only 690 fathoms on it and comparatively steep sides, at a distance of about 400 miles S.E. of

Cape Farewell, in 56° N. and 34° 51' W. Basaltic and other volcanic stones were brought up, and it is remarkable that these stones are sharp and angular, and not water worn, as would have been the case if they had been conveyed any considerable distance by a current.

The 'Valorous' arrived at Devonport, after an absence of three months, on the 29th of August. Her officers and ship's company have done good service, and have most cheerfully and zealously faced dangers, borne hardships and discomforts, and performed much heavy additional work of a novel character. Their services deserved some recognition, whilst those of their gallant captain, to whose energy, prudence, and high seamanlike qualities the success of the voyage is due, are sufficiently indicated by the above succinct statement of the work that has been achieved. Captain Loftus Jones has been exonerated from all blame by the Lords of the Admiralty, for the grounding of the ship off Holsteinborg; and the able and judicious way in which he carried out his instructions has been fully approved. The officers and ship's company of the 'Valorous,' in recognition of the arduous character of the service, have been granted double pay from the day the ship left Spithead to the day of her return to Devonport. The results of the cruise of the 'Valorous' are a collateral benefit derived from the despatch of an Arctic Expedition, and should be looked upon and rewarded as the first-fruits of that great national enterprise.

THE ATTREK BED OF THE OXUS.

THE discovery of an ancient bed of the Oxus, passing through the gap in the Kurrendagh Hills, south of Kizyl Arvat, to enter the Caspian by the course of the Attrek, seems to throw light on a passage of Strabo, which has hitherto been somewhat obscure. In Book XI., cap. 7 of this author, it is said that Hyrcania has the advantage of being entirely traversed by the lower courses of the rivers Oxus and Ochus; and though the information given is scanty, it suggests that some portion, at least, of the Oxus waters took the direction indicated by Sir H. Rawlinson, during the recent meeting of the British Association at Bristol.

About the Christian era, geographers were uncertain whether Ochus was or was not, a separate stream from Oxus. Some who were of the first opinion stated the course of Ochus to be more to the south than that of Oxus, while others affirmed that the two rivers first ran separately, and afterwards united their waters, which then flowed down to an outlet in the Caspian Sea. The grounds for this belief have now been explained by the discovery of the Oxus-Attrek bed, for the latter river* may be safely identified with Ochus, described by Apollodorus, as being the nearest river to the Parthians.

The conflicting opinions which were current in Strabo's day, regarding the lower courses of the two rivers in question, suggest a doubt as to whether the principal and continuous stream of the Oxus flowed by the recently discovered bed, and seem rather to indicate that Ochus received such an intermittent supply, as an irrigation canal derived from Oxus, would have carried. It is to be remarked besides that the slope of the Oxus-Ochus course is flatter than that

possessed by the ancient bed, which has been observed by Russian officers to run from the east to Igdy Wells, where it unites with the old Uzboy Channel, whose mouth is in Balkân Bay. Such a direct east and west course for the Oxus from Chardjui, would also far better respond to the concise statement of Herodotus, who described one arm of the Araxes to have a *clear* course to the Caspian, than the indirect Oxus-Ochus course. It is true that this old bed, from Chardjui to an outlet in the Caspian, has not yet been established as being in existence throughout the whole distance; but ancient local tradition as well as the reports of Turkomans, leave little room for doubting that it actually does exist.

The Arabian writer Mokaddassî (10th century), an extract from whom has been recently published by Professor M. J. de Goeje, speaks of the old direction in which the Oxus flowed, and relates the fact of the river having taken a new direction. The passage about to be quoted occurs on p. 13 of the Professor's pamphlet, *Das alte bette des Oxus* (Leiden, 1875). "When the King banished them (the malcontents) to Khwarizm, he diverted a canal from the Oxus in their direction, in order that they might cultivate the soil. The main stream at that time ran to a town beyond Nesâ, called Balkân, whose prince went to visit that (banished) population and found it to be composed of very capable people. He was the host of their chief, and gambled with him, and it was the Khwarizmian who won. It had been agreed that the winner should have the right of opening the canal from the Jyhoon for a day and a night, and the Prince of Balkân kept his word. But when the water was allowed to flow freely, the stream ran with such force and rapidity, that it was unable to be stopped, and in this way the river took the new direction, which it has to-day." In this passage it will be noted that the *main* stream flowed to Balkân, but this fact would not of course prevent a canal being led from the Oxus past Nesâ* (and . . . Kizyl-arvat) through the gap in the Kurrendagh Hills, to a junction with the course of the Attrek.

The above curious and important passage, extracted from a MS. of Mokaddassî, obtained by Professor de Goeje from Constantinople, affords a good illustration of a paper (read at the recent British Association meeting and) which attributed the changes which have taken place in the course of the Oxus, to the very ancient practice of irrigation from its waters. The change, described in the tradition recorded by Mokaddassî, of the flow of the river from its outlet at Balkân, would have deprived the Oxus-Ochus course of its waters, just as (perhaps), some twelve or fourteen centuries subsequently, the last change of the Amú Darya from its Caspian outlet, to which it flowed by Uzboy into Lake Aral by the present course, turned (as Abu-'l Ghâzy Khan tells us) the environs of Kunya Urgenj and the whole country to the south-west of that place into a desert.

Professor Rawlinson said at Bristol that if a vast tract of what was now sandy wilderness (on the east of the Caspian) was in ancient times a well irrigated and fertile region, much light would be thrown on early Parthian history. The *if* here used seems if anything to possess an excess of the virtue of caution; for it seems difficult to avoid the con-

* The Ochus is more probably the Tejeud.—ED.

* Nias-tepe?—ED.

erous Islets and Reefs about here

Plan of the
HARBOUR OF HOL

(GREENLAND),

And of its outlying Islands

clusion that the greater portion of the vast sterile wilds lying to the west of the great Central Asian plateau, have been actually made into sandy deserts by the practice of irrigation from the Oxus. Year after year, from the remotest antiquity, in some one or other of these latitudes, the sand deposited by the intercepted waters of the river has been excavated from the canals to be placed upon their banks, from whence it has again been distributed by the wind, over the whole country.

Thus the Chorasmia itself of early history may be, so to speak, but a palimpsest, which was written on the surface of Western Asia, over earlier and effaced civilizations. Of these no trace remains, unless a speculation may be hazarded that one such civilization was swept away by the Massagetes, living on the banks of those northern arms of the Araxes, which were not improbably irrigation canals, derived from the Oxus by an Aryan race of a previous epoch. Nor need this train of speculation be regarded as entirely unprofitable, for it leads to a forecast of changes which may be wrought upon the face of Nature, in regions where the two extremes of European culture and development are not unlikely one day to confront one another. HERBERT WOOD.

A SKETCH OF MONGOLIA AND THE COUNTRY OF THE TANGUTANS.

MONGOLIA is a vast country extending from the Khingan Mountains (separating it from Manchuria) on the east to the Tian Shan and Pamir on the west, and from Siberia on the north to China Proper on the south.

In its western part it has been very little explored, and if we except Mr. Ney Elias's route, in 1871, from Kwei-hwa-cheng to Uliassutai and some recent Russian travels in its north-west, it is almost unknown. In its centre lie the great trade-routes between Russia and China; here as well as on the east it has been mapped and surveyed by scientific explorers. The travels of Colonel Prejevalsky give a graphic description of this country, and supply a great deal of interesting information which the limits of this sketch will only allow of my briefly mentioning, but which will be found in detail in an English edition soon to be published.

A strip of fertile country extends along the north of Mongolia to about the meridian of Urga. Here the scenery is very like that of Eastern Siberia, although the forests are not so dense or the trees so fine as those which grow on the banks of the Amur. It is watered by some tributaries of the great northern rivers, but the pasturage is rich and abundant, the slopes of the hills and the valleys are well clothed with grass, and animal life is still plentiful. Not until he leaves Urga need the traveller prepare himself for the terrors of the great desert of the Gobi, or as the Mongols call it *Shamo*, which extends across the greater part of the continent. Here he will cross miles and miles of perfectly bare level sand, the only relief to the eye being a few stunted bushes and tufts of saline grass, the only living creatures steppe antelope, the little *Lagomys ogotono* allied to the hare tribe, larks, sand-grouse, and a few birds and beasts of prey. Now and again a long train of tea-laden two-humped Mongolian camels pass along on their way to Kiakhta,

or an encampment of Mongols stands by the roadside. With these exceptions there is nothing to break the monotony of the long and tedious journey.

The inhabitants of Northern Mongolia are the Kalkas, a nomad pastoral people, whose chief wealth consists in their flocks and herds, and whose only occupation is roaming from place to place in search of pasturage for them. They pay no tribute to China, but are liable to military service, and are divided into *banners* or districts under the control of mandarins of high rank; for local purposes they are governed by their hereditary princes, who claim descent from Jinghiz Khan. The Kalkas are types of the pure Mongol race, the characteristics of which are shown in their high cheek-bones, round flat faces, scanty hair, absence of beard or whiskers, oblique eyes, low foreheads, square thickset figures, and moderate stature. They are ardently attached to their nomad life, cheerfully enduring the extremes of cold and heat or whatever hardships may befall them. Their habitation is the *yurta* or felt tent, characteristic of the whole of Central Asia, which is easily taken to pieces and removed on the backs of camels. The horse is their favourite domestic animal, and they ride on every occasion, the shortest distances never being performed on foot if they can possibly avoid it. Horse-racing is quite as popular a pastime among them as among their western *confères*, and the Mongol "Derby" is run at Urga every year in the presence of a large concourse. Mounted on his fleet steed, scouring the plain, the Mongol is in his element. He hates a settled life, detests agriculture, and despises the industry of his meddling neighbours, the Chinese. Displaying extraordinary sagacity, patience, and endurance in the field, his intelligence in all else is that of a child. With the most eager curiosity, repeating question after question, he fails to understand the simplest thing.

The Mongols are Buddhists by religion, for which their natural indolence well befits them. One third of the male population belongs to the class of clergy so called Lamas, who exercise an almost unlimited influence over their secular brethren. In all the ordinary affairs of life their opinions are consulted and followed implicitly: if a cow has fallen ill or strayed from the herd, or if a journey has to be performed, recourse is always had to the priest, who at length (such is the respect paid to him) believes himself endowed with supernatural powers. Urga is the headquarters of Lamaism in Mongolia, and ranks next to Lhasa in Tibet as a place of pilgrimage. Here resides the *Kutuktu*, an important personage in the Buddhist world, ranking third in the hierarchy, and enjoying large revenues derived from land and slaves, as well as from the offerings of the faithful. It is a curious sight to meet a Mongol prince on his way to pay his vows at one of the great shrines. He travels with his *yurta* or felt tent, his family, a large retinue of attendants, and a flock of several hundred sheep to supply them with meat *en route*.

In the south of Mongolia the inhabitants are Chakhars, whose territory lies for several hundred miles outside the Great Wall. They live partly with the Chinese, and owing to frequent intermarriages with the latter for many generations past, have lost the distinctive Mongol type, resembling the Chinese in external appearance, and closely imitating them in dress and manners. But they are bad specimens of

both races, for while they still cherish their native indolence and aversion to toil, the good qualities which they inherited from their primitive ancestors are entirely lost in the degrading vices learnt from their adopted countrymen. They are opium-smokers, rogues and thieves of the first water, and the traveller must beware in passing through their country of losing everything of value in his possession.

So much for the Mongols—let us now give a glimpse at the border-land of the Celestial Empire. From the northern bend of the Yellow River or Hoang-ho, on the west to the gulf of Pechihli on the east, extends a formidable girdle of mountains, which define the high arid steppe from the rich low plains of China. This, from the earliest historical times, served as a place of gathering for the hosts of barbarians who from time to time swept a wave of conquest and desolation over the thickly populated but defenceless plains beneath. The *Great Wall*, which runs along the axis of the range, built with incredible labour, under the supervision of the Emperor and his officers, was no check to the inroads of enemies, and it is difficult to say what could have been the motive for such a waste of national strength. These mountains, like all other ranges of Mongolia, are only developed on one side, *i. e.* towards the plain at their base; from the opposite side the traveller imperceptibly ascends through low hills until suddenly a magnificent panorama unrolls itself at his feet. Wild peaks, rocky valleys, precipitous cliffs—in fact Alpine scenery with all its grandeur is before him, with many a silvery stream and populous town or village in the distance.

Two distinct chains of mountains must now be descended, separated by a plain. At the foot of the first pass stands Kalgan, a large Chinese town, and the emporium for the overland tea-trade; at the foot of the second, Nankow, well known to Europeans. The contrast between the rigours past and the genial warmth which now greets the traveller is remarkable. But it is not our purpose to describe those better known parts of the Celestial Empire, so we will return to its borders in the far west. Here some hundreds of miles from its mouth the Hoang-ho makes a great bend to the north, till it is stopped by mountains which form a continuation of those to which we have already alluded, and, after flowing for some distance to the east, takes a southerly course, embracing in this way a great peninsula of territory, which is called Ordos, after a people of that name, who derive their descent from the Mongols. This is for the most part a waste of drifting sand, probably at one time the bed of a great lake, only becoming fertile in the valley of the river itself. Numerous are the legends and traditions connected with this country; in all of which the great figure of Jinghiz-Khan stands forth as the hero. Here he slew countless numbers of his enemies, and to this day it is related how the groans and shrieks of the spirits of the departed add to the terrors of the surrounding wilderness.

Equally sterile, gloomy, and monotonous are the plains of Ala-shan, situated to the west of the Yellow River, *i. e.* on its left bank.

As the traveller advances westward towards Kan-su he will see traces everywhere of the great Dungan insurrection, which has lasted upwards of ten years, and at first threatened to shake the power of the Manchu government. Had the rebels shown more

energy and resolution, and had they chosen to act under one leader, the 4,000,000 of Muhammadans, scattered in all parts of the Chinese Empire, might have risen as one man, and carried the banner of the Prophet in triumph to the very walls of Peking. But, satisfied with throwing off the yoke of China, and taking possession of some of the towns in Western Kan-su, they devoted themselves to loot and plunder the surrounding country, driving off the cattle and slaying the unfortunate inhabitants. The Chinese in their turn assumed the offensive, and now they are gradually re-establishing their authority in the revolted districts.

Kan-su, the westernmost province of China Proper, and the seat of the Muhammadan rebellion, is a very different country to any part of Mongolia. Owing to the dampness of its climate, its rich loamy soil, sheltered valleys, and lofty mountains, vegetation is abundant and varied; birds, too, abound, especially songsters; in fact, the flora and fauna of this region bears some resemblance to the Himalayas. Chief among plants deserving of notice is the medicinal rhubarb (*Rheum palmatum*), which grows in great perfection in sheltered spots on the lower slopes and in the valleys, and is even cultivated in the gardens of the inhabitants, among whom it is a favourite remedy for themselves and their cattle. The hillsides are clothed with splendid rhododendra, including four kinds hitherto unknown, one of which, a magnificent shrub with white flowers, attains a height of 12 feet. In fact naturalists would find a wide scope for their labours in these districts, so bountifully endowed by nature.

The most useful domestic animal here is the *yak*, combining all the qualities of an excellent milch-cow with the strength and endurance of a beast of burden. Colonel Prejevalsky says that, heavily laden, it will swim across deep rivers. Ladies are acquainted with yak lace made from its hair, but good cloth is also manufactured from it by the Chinese which serves as clothing for the natives, and is well adapted for the moist climate.

The inhabitants are chiefly Tangutans, a race closely allied to the Tibetans. Their habitations are black tents or, where timber is plentiful, wooden huts. In appearance they resemble gipsies, and are distinct from the Mongols, although they prefer a nomad to a settled life, and are chiefly engaged in pastoral pursuits, rarely cultivating the soil. Unlike the Mongols, they are inhospitable, cunning, and avaricious, and one of their tribes, the Kara-Tangutans, inhabiting Koko-nor, is notorious for its predatory habits. As we ascend the head-waters of the Yellow River the mountains become higher and higher, until near Koko-nor they attain the limit of perpetual snow.

Koko-nor, or the Blue Lake, lies at an elevation of 10,500 feet above the sea, surrounded by mountains which set off the dark blue waters. It is about 200 miles in circumference, and has an island near its south-western shore inhabited by ten hermit Lamas, whose only communication with the shore is in winter over the ice, there being no boats on the lake, and the inhabitants not understanding navigation. A curious tradition is told by the natives with reference to its origin, of which the following version is nearly the same as that related by Huc, with the single addition of an allusion to the island:—In olden days, before the

present residence of the Dalai-lama was built, one of the sovereigns of Tibet thought of building a splendid shrine in honour of Buddha, and, having selected the site, commenced building. Several thousand people worked at it for a year, but no sooner was it on the point of completion than the whole building suddenly fell to ruins. The work was recommenced, and a second time it fell to the ground from some unknown cause. This was repeated a third time. Filled with surprise and alarm at such a strange catastrophe, the king had recourse to a Gigen to tell him what was the cause of such a strange phenomenon. The prophet however could give no satisfactory answer, but told his master that in the remote East there lived a holy man who alone of mortals knew the secret, and that if he could make him divulge it, the building might be finished. Upon hearing this, the monarch chose a trusty Lama, and despatched him to look for the holy man.

The envoy spent several years in travelling through the Buddhist countries, visiting all the most famous shrines, seeing and conversing with all the *gigens*, but without discovering the man answering to the prophet's description. Disgusted with the ill-success of his mission, he resolved to return home. One day as he was riding through one of those extensive steppes which lie on the borders of China and Tibet, the buckle of his saddle-girth broke, and seeing a solitary little hut at the edge of the plain, he entered to get it mended. There he saw a blind old man praying, who rose and welcomed his guest, offering him a buckle from his own saddle, and inviting him to drink tea, inquired of him whence he had come and whither he was going. Unwilling to disclose the object of his journey, the Lama answered that he was a native of the East, and was travelling with the object of praying at the different temples. "Ah! we are fortunate," said the old man, "in possessing so many gorgeous temples. They are trying to build one in Tibet, but they will not succeed because, beneath the site they have chosen, there is a subterranean lake which undermines the foundations. But prithee, keep this secret, for if the Tibetan Lamas were to hear of it, the waters of the lake would come here and drown us."

Hardly had he finished speaking before his guest started from his seat and, announcing that he was a Tibetan Lama who wanted to know the secret, jumped on his horse and galloped away. Despair and fear took possession of the old man. He began calling loudly for help, and as soon as one of his sons, who was tending the herd not far off, came in, the old man bade him quickly saddle a horse, overtake the Lama and cut out his "tongue," of course referring to his secret, and by ordering his son to take it, he authorised him at the same time to kill the Lama. But the word "Khileh" means in Mongol the tongue of a man or animal, and also the tongue of a buckle to a girth. Therefore when the messenger overtook the Lama and told him that his father desired him to return his "khileh" he unfastened the buckle which he had borrowed and willingly surrendered it. On receiving it the son returned to his father who, on learning that the buckle of the girth had been brought back and that the Lama had been allowed to continue his journey, exclaimed "God's will be done! all is over! we are lost!"

True enough that night a fearful subterranean noise was heard, the earth opened, and water poured forth

which soon flooded the plain. Many people and cattle perished, the old man among their number. At length God took pity on sinful mortals. At his command a wonderful bird appeared which took up in its claws a great rock from the Nan-shan Mountains, and threw it into the fissure, out of which the waters were issuing. The inundation was checked, but the flooded plain remained a lake, and the safety-bringing rock became an island which may be seen at the present day.

The water of Koko-nor is extremely salt. It is fed by a few streams, the most important of which is the Pouhain-gol with a course of about 260 miles (according to the natives) from the Nan-shan Mountains, where it takes its rise. Its valley is from 8 to 10 miles wide, and is bounded on the south by a lofty range, which extends along the southern shore of the lake, continuing for a great distance to the westward, where it probably unites with the northern range. Between the mountain system of Koko-nor and the frontier of Northern Tibet lies the saline marshy plain of Tsaidam.

E. DELMAR MORGAN.

EXTRACTS FROM LETTERS FROM MR. NEY ELIAS.

THE following interesting extracts from a letter of Mr. Ney Elias's, dated Bhamo, 4th January, 1875, (before the catastrophe of Col. Browne's expedition) were sent by Mr. Elias's correspondent to the Editor many months ago, but through an accident were not then inserted. The first passage was communicated in illustration of Marco Polo's statements about the absence of "Leeches" (or medical men), and the practices of Devil-conjurors, in Yunnan. The second in illustration of his story of men with tails:—

Here is an epitome of the yarn that an old Lenna Pawmine (or sub-chief) spun to me entirely spontaneously:—

"In the beginning the chief *Nat*, or spirit, Nūn Kwan, gave all the nations medicine seed, and they all took it to their respective countries and sowed it. The Kachyns sowed them in the hills, but as soon as it came up the buffaloes came and ate it; then they tried it in the plains, and the pigs and rats ate it; and lastly, they tried to grow it close to the water's edge, but here the fish used to jump out of a night and devour all the medicine as soon as it came up. Thus there was no more medicine left, and no scope for doctors. Therefore, when a person falls ill, they appeal to the 'Devil conjurors,' who find out what animal's ancestor ate the particular medicine good for the disease in question, and recommend the sacrifice of one of its species for the cure of the sick person—that species of animal being responsible for the want of the necessary medicine." He gave me no particulars of the actual proceedings of the "Devil conjurors," but I hear from other sources that there is dancing, &c., as Marco Polo describes, while the main feature—that of sacrificing animals—is prominent in both stories.

On the way up here to Bhamo, I fell in with a man named William B—, an orchid collector for some nurserymen at home, who has travelled in some of the most out of the way places in the world. He *volunteered* the information to us all on board the steamer that he had seen men with tails, and was of course laughed at. I questioned him about it afterwards, however, and this is what he told me: He sailed from some port in the Philippines (I forget the name) in a country boat, and after cruising among a number of

islands to the Sound, he one morning made the N.E. coast of Borneo. In the afternoon he went on shore to look for orchids, and was met by some very low-looking people, who had tails about the size of his middle finger—the tails were apparently stiff, not movable. The people were not quite black, and though of a very low type, scarcely so low, he thought, as the aborigines on the northern part of Luzon, who live in trees without ladders to go up by, or as the cave-dwellers he had seen on the Spanish main.

The men went naked, but the women wore a slight-bark covering, and he did not notice any peculiarity about the thumbs or toes, or the length of the forearm. He walked through the jungles during the afternoon, followed by some of the people, but found no orchids, and not liking the look of things, went on board; in the evening sailed away still further to the Sound.

Next day he landed again and found people without tails. He saw none of the habitations of the tailed people during his short visit, and no *perforated stools*; but he saw that some of them carried a kind of spear, and he feared their being poisoned. Mr. B— (who is a man of very slight education by the way) had never heard of tailed men, and was much struck when I showed him your note at p. 244 of vol. ii. He is not quite clear about the geography of the places he has visited, but thinks, in this instance, he was on the extreme N.E. peninsula of Borneo, whilst less than a day's sail to the Sound carried him out of the region of "taylords."

RECENT JOURNEYS IN PARAGUAY.

(Continued from page 273 of our last number).

AFTER crossing the Upper Aquidaban our homeward route lay along the north side of this river, at varying distances from it, generally through woods more or less dense, and from the heights between the little tributaries occasional fine views over the forest-clad valley of the Upper Aquidaban were obtained. Beyond the arroyo Guasú, the largest upper tributary, a very remarkable chain of isolated hills, of most irregular outline and generally with precipitous sides, is known as the Cerro Sarambi or the "scattered" hills.

At the pass of the Guasú we came upon a party of Cangua Indians, fishing in the arroyo. Though this tribe is said to be numerous, these were the first and only Indians met with on this journey; this is perhaps to be accounted for by their aversion to mix with strangers, and their desire to keep their dwellings concealed. In appearance they differ a good deal from the civilised Guarani: the men were of good height and proportions, the women small; their skin is of a dark-red brown, the hair coarse, black, and long, coming over the brow, where it is cut across above the eyes; the face is oval, the brow wide, and the expression more or less intelligent and bright. The eyes, slightly turned up at the outer corners, and the mouth, strongly curved downwards, give a peculiarly Mongolian appearance, though the nose is aquiline. For dress they wear a simple waistbelt of cloth; the men have a chin ornament consisting of a spike of amber-like gum 2 or 3 inches long, passed through a slit in the lower lip depending on the chin, and kept in its place by a cross head. From one of them I obtained a bow of black hard wood, 7 feet long, strung with a cord made of aloe fibre, and an arrow 5½ feet long, made of cane with a barbed hard wood point. Their other weapon is a sort of short spear or pike.

On passing the Arroyo Puente Cuhá (hammock bridge), we skirted the base of the Cerro Tranquerita, a long isolated mass with a perfectly level top surrounded by a cliff edge. From this point westward to where we again struck the Aquidaban at the Paso Mbotú the country assumes an appearance exactly like that through which we had passed in going northward to the Apa, the woods giving place to park-like scenery, and ultimately to fine palm dotted grass camp.

Hydrography of Paraguay.—The two great rivers which enclose the country are the Upper Paraná and its tributary the Paraguay, but these differ in character in every respect. The portion of the Paraná* with which we have to do lies between the cataract of Guayrá in lat. 24° 4' 30" S., on the Brazilian frontier, and the confluence of this river with the Paraguay at the south-western corner of the country. For the first accurate map and description† of the higher portion of the river, from Ytapua to within 7 leagues of the Salto Guayrá, we are indebted to the commander of the Brazilian gunboat 'Tacuary,' which has been stationed for some time at the pass of Ytapua, near the point where the upper river turns westward. In 1874 the commander of this small vessel received orders to proceed up the Paraná to bring back the members of the Commission of Limits, who having concluded the survey of the northern frontier along the line of the Apa and the cordillera to the Salto of Guayrá returned by the easier water route to Asuncion.‡

The Boundary Commissioners, who remained for more than a month in the immediate vicinity of the great fall of Guayrá, and made accurate measurements of it, fully confirm the description given by Azara of this magnificent cataract:—"At the moment when the river precipitates itself it has, in its average state, great depth, and a width of 4470 yards (2100 toises), or nearly a marine league. This enormous width is suddenly contracted to a narrow gorge of only 65 yards (30 toises) into which the whole mass of water plunges with terrific fury. . . . The waters do not fall vertically, but in a plane inclined 50 degrees to the horizon, giving a height, in a perpendicular direction, of nearly 60 feet. The spray or vapour, which rises in columns at the moment when the waters strike the walls of the rocky gorge, or some points which stand out in the middle of the precipice, may be seen for several leagues round: close at hand in the sunlight they form rainbows of the most lively colours, in which a tremulous movement may be observed; moreover, these vapours fall in an eternal shower of rain in the neighbourhood of the fall. The noise of the cataract may be heard for six leagues round."

For some leagues below the great fall the river is hemmed within the narrow gorge, rushing down over reefs and rapids in which no boat could live. For

* *Para*, the sea; *nd*, like (Thompson).

† Report by Commr. J. A. de Alvarim Costa and Lieutenant Frederico Ferreira de Oliveira, published in the Brazilian *Diario Official*, 1874.

‡ When at Ytapua, I had the pleasure of inspecting the large scale chart of the upper river made by Commr. Costa: without permission from head-quarters, however, it was not possible to allow me to have a copy of the MS., and I have not been able to make use of it in the sketch map.

9 miles beyond this, in the portion examined by Lieutenant Oliveira with the boats of the 'Tacuary,' the breadth of the river is from 190 to 240 yards, the current from 5 to 6 miles an hour. The highest point reached by the 'Tacuary' (in about 24° 30") may be considered as the limit of the navigation of the Paraná from the ocean. In the portion between this limit point and the mouth of the Y-guasú or Curityba the width of the river increases gradually from about 240 yards to 600 yards, but frequent sharp currents, whirlpools, and eddies render the navigation still difficult, and in some places dangerous.

From the Curityba down to Ytapua the breadth of the Paraná increases from an average of 1200 yards to where it attains a majestic expanse of nearly 3000 yards: the current of this lower section is estimated by Commr. Costa to average 3½ miles per hour, though more rapid currents are frequently met with. Very remarkable and sudden bubblings up of large masses or mounds of water in the more turbulent parts of the river, are characteristic of the Paraná throughout, and may be accounted for by irregularities in the rocks which form the bed of the river, against which the water being driven by the strong current rises in a spiral form to the surface. The banks of the Paraná above Ytapua are uniformly high and rocky, either precipitous or with steep, forest-covered slopes, and almost every one of the numerous tributary rivers and streams tumbles into the bed of the Paraná, forming often a splendid succession of falls and cataracts on each bank. One of the finest falls is that of the Y-guasú (great water), the largest tributary from the east, but this one is distant two leagues from the mouth of the river.

Below Ytapua the Paraná turns westward, and though the current remains strong, the river assumes a somewhat different character to that of the northerly portion: its banks are now low, and bordered, especially on the northern side, by vast marshes, known by the general name of Neembucú, "the endless." Not far below Ytapua the river divides into a northern and southern "riacho," embracing the large islands of Yacireta and Apipé. The rapids of Santa Maria on the southern branch, and of San José-mi on the northern side of Yacireta, interrupt the navigation when the river is low, though they are easily passed when the river is in flood, and but small engineering labour would be requisite to make a navigable passage here at all seasons.

Downwards from Apipé to the confluence of the Paraguay very numerous banks and islands occur in the river channel, which spreads out in width, till, above the town of Corrientes, it is more than 2 miles from bank to bank. Considerable use is now made of this section of the Paraná as a highway of traffic: four steamers a month, taking cargoes of yerba, wood, and tobacco, in exchange for general stores, regularly navigate the river from Corrientes up to the now rapidly growing village of Ytuzaingo (formerly the Tranquera of Loreto), situated on the Correntine shore, opposite the island of Apipé, and immediately below the rapids which first obstruct the river. From this place to Ytapua or San José, also a flourishing settlement of mixed Argentines, Brazilians, and Italians on the south side of the river, opposite the old Jesuit reduction of Encarnacion, communica-

tion is maintained not by river but by road, on which carts pass regularly to and fro in connection with the steamers at Ytuzaingo. The small canoe port of San Cosme, in the Missions, carries on a little traffic with Ytapua, exchanging tobacco for provisions. An idea of the strength of the current of the Paraná at this place may be formed from the fact that the canoes from San Cosme take two days to go up to Ytapua, but come back with the stream in four hours. Traffic above Ytapua is confined to the transport of yerba collected at the two Paraguayan settlements of Pirapitai (or Villa de Azara) and Tacurupucú, above and below the mouth of the Rio Munda-y,* in 25° 20" and 26° S. lat.

Canoes, small barges, and occasionally small steam-launches are employed in this traffic, taking up cattle for the supply of the yerba-workers, and bringing back the tea packed in large "canastas," or rough wicker-baskets, to be selected and re-packed at Ytapua and the surrounding settlements. Smuggling of yerba is carried on to a very large extent in this part of the Paraguayan frontier, and the government is apparently powerless to stop this infringement of the revenue: the amount of yerba which passed down the Paraná without paying duty in 1874 was estimated at 50,000 arrobas. The passes across the Paraná into Paraguay are now used chiefly in the cattle traffic, to which I have referred; those at which small steamers or canoes are placed, are the Paso de la Patria, near the confluence of the Paraná and Paraguay, and, in order, higher up the river, Cerrito and Yta-guaté, Ytuzaingo and San José-mi, Ytapua and Encarnacion, Candelaria, and Corpus. At Ytapua I was assured that the Paraná has no set time of rise and fall, although it has been compared in this respect by some of the Jesuit writers to the Nile: its risings are numerous, however, and prompt, much more so than those of the Paraguay, and it is said to become higher in December than in any other month. Capt. Page, in describing the Lower Paraná, says: "The rise of the water, which begins in December, is about 12 feet: it reaches its maximum in August. There is also a partial rise of 6 feet in October, which, rapid and transient, continues one month, and then falls to its former level in the same space of time."

The Paraguay, surveyed in 1853-1856 by Capt. Page, in the U. S. S. 'Waterwitch,' has been so fully described by him, that I shall only refer to his work.† Besides being only a sixth part of the width of the Paraná, at the confluence of the two rivers, its current is less rapid and more uniform, not exceeding 2 miles an hour, excepting in a few places. Riachos or lateral channels are very frequent, while these are absent altogether in the corresponding southerly portion of the Upper Paraná. The wooded banks are almost uniformly from 10 to 15 feet above the level of the river, the country on each side being generally low, and wherever they have fallen into a little cliff by the action of the river, they present a level stratification of sand or clay beneath the thick layer of surface soil. The rise and fall of the Paraguay are also regular: the lowest stage is reached in the end of February, the highest about the end of June,

* Thieves' river.

† *La Plata, The Argentine Confederation, and Paraguay.* By Thomas J. Page, U.S.N. New York, 1859.

between which seasons there is a gradual swelling or decrease. The average limit of rise and fall does not appear to exceed 15 feet. Azara states that the waters have attained a height at times of 30 to 40 feet above their mean level, but no such extraordinary rise appears to have taken place recently. Azara and Page have each measured the volume of the Rio Paraguay at Asuncion, with results which correspond very closely; both have carefully measured the width of the river at Asuncion, and dividing this into three sections, have ascertained by sounding and floats the depth and rate of current in each, the former obtaining a result of 359,816,000 cubic feet,* the latter 350,618,000 cubic feet an hour, as the volume of the river at an assumed normal level.

On account of its gentler and more uniform character, the Paraguay is a much more important highway of communication than the Upper Paraná can ever become, affording as it does a waterway into the far interior of Brazil, to points more than 1500 miles distant from the ocean. Four steamers, making fortnightly trips, navigate the Paraguay as far as Asuncion, keeping up communication between that port and Buenos Ayres; two other steamers, belonging to a Brazilian company, starting from Monte Video, touch at Asuncion in passing up the river to Curumba and Cuyaba in the province of Matto Grosso, and by means of these more or less regular packets, the larger part of the interchange of goods is effected. Besides these a number of small Italian schooners find their way up to Asuncion, though the voyage against the strong current of the Paraná is a work of much time. It appears that it is not at all uncommon for such vessels to spend six months in ascending the river, and they are often to be seen moored wind-bound to the trees on the bank, for weeks at a time.

The tributaries of the Paraguay, unlike those of the Alto Paraná, are almost without exception navigable in a greater or less degree, and in this way are available for opening up the resources of the country. The most northerly of those which spring from the central cordilleras of Paraguay, is the boundary river, the Rio Apa,† flowing a little below the 22nd parallel. Page ascended this river for 6 miles from its mouth, finding its general width about 300 yards, its depth not less than 9 feet, and the banks low; in 1873 the Limits Commission navigated it in a small canoe up to its confluence with the Estrella, requiring only one portage, at a quartz reef which crosses the river bed at about 40 miles from its mouth. The canoe was afterwards taken up the Estrella head-stream to within 16 leagues of its source.

The character of the Aquidaban‡ (the next river to the south) is different to that of the other large tributaries of the Paraguay in this region; its current is rapid, the channel stony and perfectly unnavigable;

* Azara records in the MSS. previously referred to that he calculated the volume of the Paraguay, as above described, at the lowest stage of the river he had ever seen, and found it 212,218,607 cubic Paris feet an hour; he assumed the average volume as half more, or 318,422,410 cubic Paris feet.

† More correctly perhaps Appa, a name given by the Mbaya Indians after their invasion and occupation of Northern Paraguay in 1661, instead of that of Corrientes, given by the first Spanish settlers.

‡ Also re-named by the Mbayas; formerly it had the Guarani name Pira-y or fish river.

it is remarkable also for its quick rise and fall. An instance of this came within our own experience; the Paraguayan section of the Limits Commission crossed it at the Paso Mbotú during a violent rain and thunder storm, the river being then at its average height; the Brazilian section arriving an hour or two later at the pass found the river so swollen as to make any crossing impossible.

The Y-pane is said to be navigable only by canoes on account of its reefs, but considerable use appears to have been made of it in former times for transporting yerba from the interior to the depôts at Concepcion.

The Jejuy (or Xexuy) next in order, southward, is a more important river, with a large drainage area. It has a depth of water generally of from 6 to 9 feet,* though in time of drought this may be reduced to 1 foot; large barges float down it from Curuguati and other points in the Yerbales through which it passes, conveying the yerba 'tercios' to San Pedro, near its mouth or down to Asuncion. Lieutenant Ammen of Captain Page's expedition ascended this river in a small steamer at time of lowest water, to a short way beyond San Pedro, but found it impossible to go farther at that season; a succession of sand-bars occur in this part of its channel, and the current was estimated at 3½ miles an hour. The chief northern tributary of this river called the Aguara-y (fox river) is remarkable as having the highest fall known in this region of South America. Azara gives the height of this fall, which he terms 'el mayor del mundo,' as 409 feet (149½ varas).

The Tapiracúa, Manduvirá, and Pirebebuy are smaller tributaries, and do not appear to have been turned to much account for navigation, excepting that by means of the last named, a great part of the heavy machinery used in Lopez arsenal at Caacupé on the cordillera, was conveyed to the base of the slope. The lagoon or marsh of Aguaracaty, bearing also different local names in some parts, extends across the basins of the two former of these rivers between 24° 30' and 25°, and is alternately covered with water or almost dried up, varying with the rainfall or drought. A fine valley between the plateau on which Asuncion stands, and the Cordillera of Altos contains Lake Ypacaray, a beautiful sheet of water 12 miles in length by 2 in average breadth; the lake is fed by the Arroyo Piraju, and its outlet river, named the Salado, is navigable to the lake for small boats, a number of which were formerly used on the lake for fishing.

By far the most important river of the interior of Paraguay is the Tebicuary, the basin of which occupies a large area of the south-western and central districts of the country, and since, in its main channel, and in its various tributaries, it affords navigable highways, ramifying over a great extent of country, it will doubtless play a great part in the economy of Paraguay if more fortunate days are in store for the country. Its chief head-stream, the Tebicuary-guasú, rises in the cordillera in about 26° S., at a distance of not much more than 20 leagues from the Upper Paraná; the Tebicuary-mi, or smaller source-stream has its rise farther north, behind the summits of the Cordillera of Villa Rica. These main tributaries

* Demersay.

unite not far from the hills of Santa Maria in the Missions, forming the main Tebicuary, which pursues a tortuous course westward to the Paraguay. The greater Tebicuary is navigable from above the village of Yuti, and a considerable number of rudely-built barges, or rafts of squared timber, are annually sent down from near this place at times of flood. A brief record of a voyage down this tributary and the main channel to the Paraguay, is given in a part of Azara's diary, published after his death.* He reached the Paraguay from Yuti in eighteen days. In company with Mr. Charles Congreve, I descended the smaller Tebicuary in February and March of this year, starting from the village of Ytapé near Villa Rica, passing down into the main river and reaching the Paraguay after twenty-two days of continual paddling and sailing. A rough compass sketch-survey, checked by latitudes, was made as we went down; unfortunately the notes and sketches of the upper portion of the river were lost by the overturning of our canoe in the Paraná a few weeks later, but the portion from Paso Santa Maria downwards to the Paraguay was preserved.

From Ytapé southward to its confluence with the greater branch, the Tebicuary-mi is excessively tortuous, often doubling back on itself for miles; so much is this the case that in one day of incessant paddling during six hours, in which we must have gone at least 18 miles, the difference of latitudes between the halting-places was less than 5 miles. The river was at its lowest when we descended, and curiously formed sand-bars, stretching diagonally across the channel, obstructed even the light draught of our canoe; marks on the banks, however, show that the river may rise to 10 or 15 feet above its low level, when all shallows might be easily passed. At a short distance below Ytapé, a considerable 'obraje' or wood-cutting work is in operation; the timber is roughly squared and sent down in rafts. Near this place we came upon a small stranded steamer, unable to make its way up to the 'obraje'; the presence of this vessel, which had been brought thus far as an experiment, was a practical proof of the navigability of the river, since her draught exceeded 4 feet. The banks of the river, both in this branch and in the main stream, are generally low and densely wooded; here and there, however, a 'barranca' of about 20 to 25 feet in height occurs, and almost invariably proves to be the edge of a great plain of tall rank grass. The edges of these grass plains where they abut on the river, are invariably perpendicular and cliff like, and much higher than the gently sloping, wooded banks. The current at the low stage of the river may be said to average 2 miles an hour, the width varying from 40 yards at Ytapé to about 150 on an average near the Paraguay, the depth from less than a foot to 15 feet. In flood the current is doubtless much more rapid, and the width and depth are proportionately increased. With the exception of one reef of basalt rocks below the pass of Santa Maria (in latitude 26° 30' S.), over which there is a rapid, falling about 4 feet in the low stage of the river, the Tebicuary presents no obstacle to navigation. Its times of rise and fall are irregular, and

are simply dependent upon the passing rainfall; when it rains the river rises immediately, and it sinks as quickly when dry weather sets in. With the exception of Yuti, near the greater Tebicuary, and Ytapé, on the Tebicuary-mi, there are no villages on the banks of the river, which flows through much uninhabited country. The pass-house of Santa Maria, on the chief track to the Missions, is the only habitation seen in descending, till the pass of San Fernando, close to the Paraguay, is reached: for eleven days at one time in going down we did not see the least sign of human life. I would commend the river to sportsmen: the woods on its banks are full of large and small game of every sort known in Paraguay, and the sandbanks at every turn are marked over with the fresh tracks of wild animals. Ducks and wild birds of every kind are in thousands; the waters teem with fish, and we have counted as many as 16 alligators lying within a space of a few yards.

The chief tributary of the Lower Tebicuary is the Rio Negro from the north, the main outlet of the Lagoon of Ypoá and of the marshes which surround it; this great lagoon is upwards of 100 square miles in area, and is surrounded by an immense tract of marsh land; it receives the river Caanabé, from the plain of Paraguari and the hills which surround it, and has several marshy outlets or slow drains to the Rio Paraguay besides this chief one to the Tebicuary. At Tabapi, near its north-east shore, I was informed that its waters are perfectly fresh, and that it abounds in fish; it is very shallow and its extent is very variable; the winds have a great effect on its surface, and when blowing strongly from north or south drive the water of the lagoon away from one shore over the marshes of the other. Though the borders of the lagoon are swampy, its bed is of firm white sand. Between the Tebicuary and the Paraná the greater part of south and western Paraguay is occupied by a series of vast marshes which run back, up the bank of the Paraná, as far as the island of Yacireta. The chief of these is that named Neembucu; and this name is generally applied to the whole range of the marshes of the Missions, which are all more or less connected one with another. But the name properly belongs to the more northerly swamp, which lies between the elevated plateau of Santa Maria and Santa Rosa, and the Rio Paraguay, which discharges itself by the Rio Neembucu at Pilar. The Yabebiri, joining the Paraná below the island of Apipé, is another chief drain of the marshes. A striking proof of the movement of the waters of these "esteros" was afforded during the war, when Colonel Thompson, attempting to raise dams or ramparts for the purposes of fortification across some of the apparently stagnant marshes in the neighbourhood of Humaitá, found the water gradually rising behind his earthworks and rendering them useless.

Little or nothing is known of the minor tributaries of the Paraguay coming from the western or Chaco side; even the names of their mouths appear to be uncertain. The two main Chaco tributaries in the space opposite the Republic have, however, been the objects of a considerable amount of interest and exploration.

The Pilcomayo is well-known at its mouth in

* *Diario de la navegacion del Rio Tebicuary*: Buenos Ayres, 1834.

the Paraguay opposite Asuncion, and in its head streams from the Andes between the 19th and 22nd parallels; but for information respecting its course through the Chaco, we are as yet dependent upon the accounts of two travellers only, one from the side of Paraguay, the other from the Bolivian side, neither of whom explored the river through its entire length, although their routes overlap one another. In 1721 the Jesuit father Gabriel Patiño accompanied by three others, an officer named José Portillo, six Spaniards and sixty Guarani Indians from the Missions, embarked on the 'Pilcomayo' on the 18th of August, in a flotilla consisting of one large barge of eighty-seven tons, and two flat canoes made expressly for the work. The first 60 leagues presented a well-banked channel and deep water with lateral lagoons, which rise and fall according to the state of the rivers. Trees fallen across the river frequently hindered the passage. From this to the bifurcation of the river many shallows occurred, and banks of sand and ridges of hard clay soil crossing the stream formed rapids which were passed with difficulty. After twenty-five days of voyaging and at a distance from the mouth estimated at 94 leagues (210 miles), Patiño arrived at a place where the river separated into two branches, 7 leagues above a rapid which had to be overcome by cutting a canal through it, a work which occupied ten days. Finding that the large vessel could not pass up further, Patiño resolved to leave it here with half of his escort, and with the two canoes and the rest of his party he continued to ascend. A distance of 80 leagues more was made without difficulty in a well-defined channel, sometimes bordered by woods, sometimes by beautiful park-lands. Several banks of slimy argillaceous soil now occurred, over which the water passed, forming a kind of rapid, and similar barriers extended over 33 leagues (75 miles). After this the Pilcomayo again became deep between high barrancas. It was now easy to see that the whole country was much higher, and trunks of trees evidently brought down in the rainy season from a mountainous region were now and then met with. Traces of Indians became frequent, and it was evident that the country was inhabited. This peopled region began at 100 leagues (230 miles) above the bifurcation of the river, and continued for 170 leagues (390 miles) to where villages of Tobas Indians were met with. These Indians attacked the expedition on the 2nd of December, and forced it to retreat. In twenty-eight days, travelling day and night, Patiño and his companions regained the place where they had left the larger vessel. This is the only considerable expedition which has ever tried the navigation of the Pilcomayo from the Paraguayan side. Azara indeed records that he ascended and mapped the Pilcomayo for 20 leagues, but has given no particulars in his published work. In 1843 an expedition sent by General Ballivian, then President of Bolivia, for the exploration of the Pilcomayo in three large vessels, failed on account of the deficiency of depth of water; but in the following year a second expedition, composed of a company of 56 men, under Major Acha and Lieutenant Van Nivel, in three barges and eight canoes, set out from the confluence of the upper tributaries on the 30th of September, and proceeded down the river without difficulty till the 5th of October. After several upsets it was

decided to abandon the canoes and some part of the stores, and until the 10th progress was made in a channel of 4 to 5 feet in depth. On the 11th the flotilla came to an immense sandy plain, where the Pilcomayo separated into about sixty small branches, all of them innavigable. Up to this point they had reckoned 189 leagues (440 miles). Rounding these sands on foot in two days' march, during which they were attacked by Indians, the voyagers reached the river channel again below, and followed its course for nine days, counting thirteen rapids. After the last of these the river lost itself again in a vast lagoon, apparently about 80 leagues in circumference. The provisions being now expended, the party began their retreat after travelling a distance which they reckoned at 389 leagues (908 miles). Their report of the innavigability of the Pilcomayo seems to have precluded any further attempt. M. Martin or Moussy who has examined these journeys critically in his work, concludes that the old channel followed by Patiño had been abandoned by the river at the place where the Bolivian expedition found the sand channels; and that the river had retained its course below that point where the same rapids described by Patiño were seen by the Bolivians. As regards the great lagoon of 80 leagues circumference, which arrested the expedition of 1844, it should be found at the place where Patiño came upon the great open lands and low banks, or 80 leagues (185 miles) above the bifurcation of the river.

In 1873 a half-hearted attempt was made to explore the Pilcomayo under the authority of the Argentine Governor at the Villa Occidental, and Mr. Robinson, C.E., then Government engineer in the Chaco settlement, ascended the river in a small steamer for a distance of 150 miles from the mouth, opposite Asuncion, when for want of proper supplies he was compelled to return. The windings of the Pilcomayo in this distance were found to be excessive, so that on the 5th day of steaming, the white houses of Asuncion could still be clearly seen over the level Chaco. The navigation, however, thus far proved easy, the least water found being 4½ feet.

The Rio Confuso, a river which joins the Paraguay a little farther north, is frequently marked as one of the hypothetical delta branches of the Pilcomayo. This delta theory, indeed, seems to have clung to the Pilcomayo at whatever age it has been mapped, though there does not appear to be the least authority for the supposition that it has more than one mouth, opposite Asuncion. An examination of the Lower Confuso made by Lieutenant Murdaugh, of Captain Page's Expedition, who went up it for 24 miles, proved that its character is altogether different from that of the Pilcomayo, and that it must have an independent rise. The Confuso water is bitter and saline; that of the Pilcomayo is brackish only when the river is unusually low.

The Vermejo, or Y-pytá (red water), the other great tributary of the Paraguay from the Chaco, is so named from the red colour of its waters, which at its junction with the Paraguay keep separate and red in contrast to the pure water of the chief river, but, afterwards mingling with them, tinge the whole of the lower river to its confluence with the Paraná. It is formed of two chief head-streams, which rise in the province of Tarija, fed from the Andes between

21° 30' and 23° S. As early as 1585 the facilities presented by this river for opening up the wide area of the Chaco were recognized by the missionaries, when the little town of Concepcion was founded among the Mocovi Indians, on its banks. The first to descend the whole of the river by canoe appear to have been the Franciscan missionaries, Murillo and Lapa, in about 1780. In 1826 a company was formed in the Argentine Republic to undertake the navigation of the river, and a Frenchman named Soria was appointed to navigate and report on it. This he did, successfully descending the river from the confluence of its head-waters to the Paraguay in 70 days, only, however, to fall into the jealous hands of the Paraguayan Dictator, Dr. Francia, who, besides confiscating boats and plans, imprisoned unlucky Soria for five years. In 1855, however, a new company was formed, and a certain Captain Lavarello was entrusted with the first venture; in a vessel of 20 tons he descended in 50 days to the Paraguay.

In 1854 Capt. Page ascended and charted the Vermejo for 122 miles, but was obliged to return then on account of defects in his vessel. More recently the navigation of the Vermejo has been taken up in earnest at Buenos Ayres, and a concession has been obtained by a company for the navigation of the river. Eight trips a year are stipulated for in their contract, and these will greatly aid in developing the trade and products of the provinces of Salta and Santiago. In May, 1874, four of these round trips had been accomplished, and the regular navigation of the Vermejo has now become an established fact. Much of the credit of this enterprise is due to Don Natalio Roldan, the director of the navigation, who has succeeded in winning over the Matabo Indians to his confidence, and last year was employing them in large numbers in canalizing and clearing the river. It is remarkable that, from the junction of its head streams down to the Paraguay, the Vermejo does not receive a single affluent. Its breadth in this space varies from 70 to 250 yards, its depth from 5 to 16 feet, and the current appears to average about 1½ mile an hour.

KEITH JOHNSTON.

(To be continued.)

THE HISSAR EXPEDITION.

THE return of the Hissar Expedition to Sher-i-sebz is announced as having taken place on the 13th of June last. The expedition explored the Khanate of Hissar from west to east, as far as the Baljuan and Kulab Valleys, and among other works succeeded in identifying the positions of the famous pass of the "Iron Gates" close to Derbent, and of the remarkable Pulisangin stone bridge over the Surkhab. Another noteworthy discovery is that the Surchan is an important tributary of the Oxus, the very existence of this stream having been doubted by Fedchenko. A map will be prepared from the route survey laid down, and fourteen astronomical positions, determined by Herr Schwarz, one of the party, will be embodied in it. In our next number we shall notice this expedition more fully.

Reviews.

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INDIAN PUBLIC WORKS.*

THERE are few more important investigations, connected with the science of geography, than those which relate to the changes wrought by man on the earth's surface, either by his destroying or by his constructive efforts. The knowledge relating to public works is, therefore, from this point of view, as much the province of the geographer as it is, from other stand-points, of the statesman and the administrator. Hence a thoughtful book on the public works of India, such as that which Mr. Thornton has recently published, properly has a place among those which it is our duty to recommend to the notice of geographers.

Mr. Thornton's high position as a political economist, as well as his long experience in the department of public works in the India Office, give weight to his matured opinions, and will secure attention to the views which he has enunciated. But the book is one that would have had many readers even if it had appeared without the author's name; because it explains points which are of great public interest with remarkable lucidity, and makes clear many things which have hitherto appeared complicated and doubtful. This is especially the case in treating of the financial aspect of Indian public works.

The most important questions connected with public works relate to the principles which should govern their construction by the State; and these principles are more clearly stated by Mr. Thornton than in any previous work. It is a generally received doctrine, true enough within certain limits, that a public work to be successful must pay; but broader considerations than direct pecuniary profit should be brought to bear when the action of the State is concerned; and the collateral effects of a bridge or of a road easily occasion an addition to national wealth, amply sufficient to compensate for deficiencies in the net revenue resulting from tolls. This question, and the comparative advantages of governmental agency and of private enterprise, both abstractedly considered and with reference to the special circumstances of British India, are discussed in Mr. Thornton's introductory chapter.

In the second chapter the subject of communications is examined; and the history of the guaranteed railway system, together with the future measures that will become necessary when the time comes for deciding questions relating to the purchase of railways by the State, are very ably discussed and explained. Among many other points of interest in this chapter, we would specially direct attention to Mr. Thornton's statement of the advantages and probable results of the construction of a railway from the fertile plains of Dharwar in the south of the Bombay Presidency to the seaport of Carwar, in North Canara.

Over an area of 3800 square miles stretch the wide cotton fields of Dharwar, where alone the American species have been cultivated with great success. Hitherto the places of shipment for this cotton have been Cúmpta and one or two other open roadsteads; and although a good cart-road has been made down

* *Indian Public Works, and Cognate Indian Topics.* By William Thomas Thornton, C.B. (Macmillan, 1875.)

the Arbyle Ghaut to the excellent anchorage at Carwar, still prejudice and local interests lead to a preference of the old route, with its miserable road and wretched place of shipment. Mr. Thornton selects this instance as one in which he argues that, even if the traffic of the proposed Carwar railway is insufficient to make it pay, still it is by no means necessarily an undertaking in which the Government, as representing the entire public, might not very advantageously engage. Regarded from a national point of view, the indirect advantages of such a railway as that from Carwar to the Dharwar plains, might, Mr. Thornton maintains, be of themselves abundant money's worth for the money spent. He then enumerates the indirect advantages of railway communication, as follows:—

“Not only are old markets made more cheaply accessible, access to new markets afforded, and production stimulated by enlarged demand for its fruits, but capital in search of investments discovers fresh fields, and producers are placed in possession of better implements and made acquainted with better processes. Together with the passengers whom they carry about, railways distribute also certain impalpable entities—observation, intelligence, invention, technical skill, and miscellaneous information—distributing them moreover carriage free.”

Dharwar, it appears, though it grows the superior New Orleans cotton, is yet so far behind hand in cultivation as that, whereas in India generally the average yield of cotton per acre is 73 lbs., in Dharwar it is only 24 lbs., although the produce of the New Orleans plant should be two or three times as great as the indigenous. If, therefore, the adoption of Carwar instead of Bombay as the ultimate port of shipment for Europe, should have no further effect than that of leading to the general substitution of New Orleans for indigenous cotton in local cultivation, and of raising the local yield per acre to the general average of India, an addition of more than 24,000,000 lbs. would be made to the total annual yield.

Such statements of the various considerations which should be in the statesman's mind in deciding questions of this kind, besides the mere figures representing direct profit and loss, are exceedingly valuable; and Mr. Thornton has done good service in so ably presenting them, both as regards this and other projects, especially that for running a line of railway into the heart of Chuttesgurh. For there is a fatal tendency, at present, to take a narrow view of government undertakings. There is danger that, in seeking to make a showy balance, to judge of enterprises by mere debit and credit accounts, all true statesmanship may be lost sight of. An administrator is not merely a shopkeeper, and in checking or abandoning an enterprise on such narrow grounds, it is probable that serious evil may often be done, that it will take years to remedy.

In the chapter on irrigation there is not only a good general view of the various systems prevailing in different parts of India, and of the methods of construction, but a discussion of the financial bearings of the question, especially with reference to the momentous points relating to a forced or voluntary payment for water; and in that on miscellaneous works there is useful information respecting harbours and lighthouses.

A yet more important section of Mr. Thornton's book is that on public works establishments—on the training, position, and treatment of functionaries in the public works department. In this chapter the absence of due confidence in officials, and the deprivation of all responsibility or discretion, is referred to as a crying

evil. Mr. Thornton thus fearlessly speaks out on this point:—

“A wise private employer understands that he cannot get the best service out of the best servants without trusting them sufficiently to allow of their exercising considerable latitude of discretion. He may summarily discharge his gardener or his coachman if he suspects him of extravagance or dishonesty, but as long as he retains either, he leaves the one to judge when and what fires are needed in the hot-houses without standing over him to see how much fuel is used; neither does he go into the stables whenever the horses are fed, in order to prevent the other from stealing the corn. But governments in general, and the Indian Government in particular, behave as if they believed all their servants to be knaves, only to be kept from picking and stealing by being sharply and suspiciously watched. The aim seems to have been less to stimulate than to control activity, for which latter purpose a regular gradation of checks has been created; and it seems also to have been imagined that the force of control would be augmented by being arrested at a series of barriers, and filtered through a series of sieves.”

Mr. Thornton's two last chapters on land tenures and on national education are of more general interest, and, as we are quite unable to concur with Mr. Thornton in the view he takes respecting the latter subject, we are glad that it is not one which comes within the scope of this Magazine. Mr. Thornton's work will be welcomed as containing a clear general review of the position of public works in India, as lucidly explaining several complicated points with reference to them, and especially as enunciating sound and statesmanlike principles in a thoughtful and suggestive way.

JUMMOO AND KASHMIR.*

MR. DREW'S *Jummoo and Kashmir Territories* forms one of the most valuable additions to our knowledge of Indian geography, which we have been called upon to notice for some time past. The author, formerly of the Geological Survey of Great Britain, entered the service of the Maharaja in 1862, and remained in it during ten years. He was employed successively as a geological surveyor, as Director of the Forest Department, and as Governor of Ladākh. The duties of these offices called him into nearly every part of the country, and his geological training enabled him to render a trustworthy account of the physical geography of the regions explored by him, whilst his official position afforded him many opportunities of becoming acquainted with the social life of the people and its rulers, which an ordinary traveller generally misses.

The Maharaja's dominion extends over territories having an area of 62,000 square miles, with a population of about 1,500,000 souls, and offering the greatest variety as regards physical features and inhabitants. It rises from the burning plains of the Panjab to some of the highest mountain summits in the world, and is inhabited by races speaking thirteen different languages and professing three kinds of religion. In dealing with so complex a subject, a methodical arrangement of facts is desirable above all things, and in this respect the author leaves little if anything to be desired. There is system in his arrangement, and where the same or kindred subjects are of necessity treated of in various chapters, a compendious index enables us easily to refer to them.

* *The Jummoo and Kashmir Territories: A Geographical Account*, by F. Drew, F.R.G.S., F.R.S. London (E. Stanford).

The author, first of all, presents us with a general view of the geography and history of the country he proposes to describe in detail. He then introduces us into the region of the Outer Hills, describes their physical features, their vegetation, inhabitants and principal cities, inclusive of Jummoo, the residence of the Maharaja. He then takes us successively to the region of the Middle Mountains, to Kashmir, to Ladākḥ, Baltistan, and Dardistan, describing in every instance the roads which connect these separate portions of the Maharaja's dominions. Finally, there is a separate chapter on the languages, with a Dogri grammar and comparative vocabularies, and an explanation of the very valuable set of maps which illustrate the volume. These maps deserve more than a passing notice, for it is but rarely that English works of travel are illustrated cartographically in so liberal and unexceptional a manner. The first of them is a general map of the Maharaja's dominions on a scale of 16 miles to an inch, and based almost exclusively upon the maps resulting from the Trigonometrical Survey of India. The hills are carefully shaded, and the glaciers, being coloured a bright green, stand out distinctly, and at once draw our attention to the most characteristic features of the Himalayan ranges. Elsewhere in this book there is an outline map of England, the object of which is to enable the reader to form some idea of the relative extent of Kashmir. A similar map of a portion of Switzerland, with the glaciers clearly marked, would have conveyed some idea of the vast extent of these Himalayan glaciers—and yet they are merely the remains of ice-fields, which in ages gone by covered nearly the whole of this region! The nomenclature of this and of the other maps has been carefully revised by Mr. Drew, and the names upon them are spelt according to the "official" system introduced some time ago, but followed as yet by hardly one amongst the numerous Government departments.

In addition to this general map there are five physical or ethnological ones, viz. (1) a Snow map, showing the glacier-region and the regions subject to the fall of snow; (2) a Race map, distinguishing eight races, and showing likewise a large tract of country, especially towards the territory of the Amīr of Kashgar, which is altogether uninhabited; (3) a Language map, showing the districts where Tibetan, Dard, Kashmiri, Pahāri and Chibhāli or Dogrā are spoken; (4) a Faith map, showing the territories of Bhuddists, Hindus, Sikhs and Muhammadans; and (5) a Political map, showing the main roads of commerce, in addition to the political boundaries. There are, in addition, a set of diagrams, and a number of very effective photographs, reproduced by Mr. Woodbury's process. We regret very much that Mr. Drew should not have ventured upon adding a geological map to the liberal set of illustrations with which he has presented us. We are quite aware that a map of this kind would have to be conjectural in a certain measure, but its very appearance would have incited to further research, and would have drawn attention to points yet to be determined by future explorers. Indeed, considering that Mr. Drew is a geologist himself, we should have expected that geology would have occupied a much more prominent place in a work designed to give an account of his labours in the Himalayas. He furnishes us with several capital illustrations of geological agency; he accounts in a manner, leaving no room

for doubt, for the occasional floods of the Indus, which he ascribes to landslips on a gigantic scale, which dam up the river, until the pent-up waters force a way through the obstructive barrier, and sweeping down with irresistible violence, carry destruction in their path; he supplies several capital illustrations of glacier action, but he fails to render a connected account of the geological features of these regions. We trust Mr. Drew will make good this omission on some future occasion.

When we turn to questions purely geographical or to the accounts given of the various tribes and castes and their customs, we are able to speak of the author's work in terms of unqualified praise. He has intentionally forbore to interweave with his narrative the accounts furnished by his predecessors. By doing so, certain portions of his work may be less complete than if he had been more of a compiler, but it has gained in freshness what it has lost in completeness, and is certainly more interesting to read than a compilation would have been. Those amongst our readers who desire to gain some trustworthy information respecting one of the most important tributary states of our Indian Empire and one of the most gigantic Alpine regions of the world, may refer to Mr. Drew's book with confidence. They will find it a very store-house of information.

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A PEEP AT MEXICO.*

MR. J. L. GEIGER, a London merchant, has spent a holiday in the United States and Mexico, and presents us with the results of his experiences in an entertaining and at the same time instructive volume. The author left San Francisco on the 4th of December, 1873, on board the 'Montana,' paid a flying visit to the principal towns along the Pacific sea-board, and then started from Manzanillo for a journey across the whole of the Republic, in the course of which he visited Colima, Zapotlan, Gauadalajara, Guanajuato, and the capital of the country, finally reaching the Mexican Gulf at Vera Cruz. Introductions to some of the leading merchants of the country afforded him an opportunity of becoming acquainted with the condition of the country, and his remarks on social and political questions therefore carry more weight than if they had been made by a mere tourist, rapidly traversing a country, and limited in his intercourse to hotel-keepers, waiters, and conductors. Mr. Geiger is hopeful of the future of Mexico, and believes in the permanency of the existing Republic institutions.

"The task of the Liberals has been gigantic, and whatever may be the faults of the Mexicans—and they are numerous—this great honour must be conceded them, that they have been in the van of the great contest of modern times—the fight of liberty against Ultramontaniam. The curse of Spain was left indelibly branded upon her colony even when its independence was accomplished: the population was thoroughly priest-ridden, fanatic, ignorant, and ever ready to rise against the power in authority; the clergy corrupt, debased, and utterly criminal, shrinking from no deed, however vile, when an iota of their power was endangered. What wonder that revolutions were easily fomented, and that hordes could be rallied by the thousand, eager to rush madly, with crucifix in hand, against any champion of emancipation of the priest."

* *A Peep at Mexico*: Narrative of a Journey across the Republic from the Pacific to the Gulf in December 1873 and January 1874. By John Lewis Geiger, F.R.G.S. London (Tribner & Co.)

To Juarez and the Laws of Reform promulgated by him in July 1859, which established religious liberty, Mr. Geiger traces the progress which has been made since those dark times, ever disturbed by civil war. The intervention of France in favour of priestly rule he looks upon as utterly unjustifiable, and Maximilian's execution, though regrettable on humane grounds, he considers to have taken place in accordance with Law, and after a fair trial. The Mexican Government has been vigorous since then in carrying the reforms into practice.

"No monk, no nun, no Jesuit as such, is permitted to reside in the Republic; no priest is allowed to range the streets in the garb of his order; cloisters and monasteries have been converted into reformatories and schools; and the levying of boxes for clerical purposes is prohibited. The masses are being afforded the means of instruction, and the aim of the Government is to rescue the youth of the land from the hands of the priest, and entrust him to those of the schoolmaster."

Incisive measures of reform, such as these, naturally rouse the opposition of the priests, backed by the uneducated masses; but Mr. Geiger considers that the Liberal party is sufficiently strong to uphold them, until they have firmly taken root.

Mr. Geiger's narrative is brisk and entertaining throughout, it is illustrated moreover by forty capital photographs, most of them taken by the author himself, and by four maps.

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THE SEARCH FOR SIR JOHN FRANKLIN, from the Journal of *Allen Young, Esq., F.R.G.S.* (Griffin & Co., Portsea, 1875).

WE are glad that Mr. Griffin has obtained permission to reprint Captain Allen Young's very interesting journal of the voyage of the 'Fox,' which originally appeared in the *Cornhill Magazine*. It is a pleasantly written account of a very memorable expedition, and those (we trust there will be many of them) who read the gallant seaman's well-told tale, cannot fail to feel regret that it is so brief when they come to the last page.

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MODERN NAVAL HYGIENE. By *Dr. Leroy Mericourt*, translated from the French by *John Buckley, Staff-Surgeon, H. M. S. 'Endymion.'* (Griffin & Co., Portsea, 1875).

THERE cannot be any doubt that Dr. Buckley has done very useful service to the navy in giving this valuable little work an English dress. In bringing its various hints and suggestions to the notice of commanding officers and surgeons of Her Majesty's ships, he has helped to strengthen their hands in their joint efforts to secure the physical well-being of the seamen committed to their charge.

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HYDRAULIC MANUAL. By *Louis D'A. Jackson, A.I.C.E.* London (W. H. Allen & Co.), 1875.

THIS is a collection of formulæ, tables, statistics, and general information about water-supply works, comprising canal, irrigation tank and reservoir construction; also the methods of gauging the discharge of water through channels, measurement of river beds, &c. It is written with special reference to India, and is intended as a manual for the use of those who may be engaged in such works in that country; while in a second part it contains a copious collection of facts connected with works already executed; also rainfall and other meteorological statistics.

The space at our disposal will not admit of giving more than a sketch of the contents, and directing

attention to the great variety of subjects comprehended in the work. It will doubtless prove of great utility to the practical hydraulic engineer, especially in India, or other countries where works of reference on the subject are not readily available, as it aims at serving as a compendium of all the information required.

The first chapter is devoted to the various formulæ required for determining the flow of water; of these we can only say that the uniform system of notation adopted is a great advantage. Some of the formulæ evidently require press corrections, see formulæ (1), page 44. We also do not find in the table of notation what is represented by S. & G. in the same formulæ. Numerical examples to illustrate the use of the formulæ would probably have been appreciated by the less scientific student.

In the second chapter we have practical instructions for measuring the discharge of streams, both great and small, with instructive practical examples from the great rivers of America; the third chapter dealing more especially with irrigation questions, entering at length into the subjects of modules, or water meters, and financial results in the principal countries where irrigation is largely adopted.

The first part concludes with sundry useful tables, and we suggest in a future edition a more complete reference should be furnished as well as the authority for the material in each table, where it is not now afforded.

To Indian engineers especially we imagine the second part will be found the most valuable. It gives complete accounts of the cost, revenue, and general principles of construction of the chief works of irrigation and water storage hitherto carried out in India. The author appears to have had difficulty in obtaining information about the Bombay Presidency, but does not explain why. The book concludes with some useful meteorological tables, from observations from various parts of India, extending over many years.

We would express our opinion in conclusion, that either the old or the new system of spelling Indian words should be adhered to throughout. For instance, the non-Indian reader would hardly recognise Roorkee and Rurkhi as the same place, and we have the familiar coin spelt rupee and rupi on the same page.

Cartography.

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Handtke's Map of European Turkey.*

MR. FLEMMING of Glogau has just published the four first sheets of a map of European Turkey, which is to be completed in twenty sheets. The sheets published embrace the whole of Bosnia, the Herzegovina and Montenegro, together with the larger portion of Servia, and, if trustworthy, would prove exceedingly useful at a time when the eyes of Europe are directed upon that portion of the Turkish empire. Scheda's map, (1:864,000) published in 1869, and the new edition of Dr. Kiepert's map (1:1,000,000) published in 1870, no doubt appeased the appetite for Turkish maps in a large measure, but the former is very incorrect and defective, the latter, though one of the most careful compilations of its justly renowned author, is on so small a scale, that a new map, nearly double its scale, and engraved in a superior style, as the map before us is, would have stood a good chance of supplanting it. Unfortunately this new map cannot compare with Kiepert's on the score of accuracy, and though it contains more names, it is less correct, in its general features, than the map which preceded it. This is all the more surprising, as Kiepert's map is accompanied by explanatory notes, enumerating the

* F. Handtke, Spezialkarte der Europaischen Türkei, 1:600,000. Glogau, 1875. Sheets 7, 8, 11 and 12, 1s. 6d. each.

materials used, and subjecting them to an incisive criticism. Surely Mr. Handtke cannot have read these notes, nor the criticisms which appeared on the publication of Scheda's map, or he would not have repeated errors which are pointed out there. Dr. Kiepert, not content with criticizing the work of others and the materials available when he constructed his map, has criticized his own work likewise. He has pointed out those portions of it which are still defective and subject to future correction, and enumerates various authorities, whose information he was not fully able to embody in his map, because of the progress already made by the engravers. In fact, he has, in a most unselfish manner, smoothed the way to any one desirous of succeeding him as a compiler of a map of European Turkey. Dr. Handtke has not chosen to avail himself of the information thus freely offered, and his work suffers accordingly. As an instance of the differences existing between the two maps we may mention that the distance from the mouth of the Drin to Zvornik is 35 geographical miles according to Kiepert, 27 according to Handtke; the distance from Zvornik to Vishegrad is 40 miles according to the former, 52 according to the latter. These differences are too considerable to be allowed to pass without comment, and unless Mr. Handtke is able to prove that Dr. Kiepert, with whom we agree, is wrong in the conclusions he has arrived at on this point, after carefully weighing every available evidence, he must pardon us if we reject his work as untrustworthy. At the same time we are willing to admit that his map contains numerous names in addition to those to be found either on Kiepert's or Scheda's maps, and that the Austrian territories, as far as shown, have been carefully reduced from the latest government surveys.

A Railway Map of Scandinavia.*

Mr. AUGUST HÄHR, the well-known Swedish cartographer, has published a railway map of the three Scandinavian kingdoms. Three classes of railways are distinguished, viz., state lines, private narrow gauge lines, and private broad gauge lines. Railways open for traffic, in course of construction, or merely projected, are likewise shown. In addition to railways, the map contains ample topographical details. Roads, towns, villages, manor-houses, iron works, mines, &c., are shown; and it therefore meets the wants of ordinary tourists.

Log Book.

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The 'Pandora.'—Captain Allen Young had reached Ivigtot on the coast of Greenland, where the cryolite mine is situated (lat. 61° 34' N.), on the 30th of July. For twelve days after that date the 'Valorous' was in Holsteinborg harbour, and the 'Pandora' probably passed that place, on her way north, in this interval. She would be at Godhavn in the first week of August, would find a supply of coals ready for her in the Waigat, and would be in good time for passing through Melville Bay.

Paris Geographical Congress.—The prizes awarded by the International Juries at the Paris Geographical Exhibition were far more numerous than was expected. According to the regulations published on the 1st of July, each of the seven groups was assigned 8 1st class medals,

16 2nd class medals and 16 diplômes d'honneur (Honourable Mention). There were in addition 42 medals and 28 diplômes for the whole of the groups, the total number of awards available being thus: 70 1st class medals, 140 2nd class medals, 140 diplômes, and an indefinite number of Letters of Distinction. The juries actually awarded 69 Letters of Distinction, 123 1st class medals, 147 2nd class medals, and 165 diplômes. These 503 prizes were distributed amongst less than 1000 exhibitors in the following manner:—

	Letters of Distinction.	1st Class Medals.	2nd Class Medals.	Diplo-mas.
I. Group (Mathem. Geo.)	17	17	17	22
II. " (Hydrography.)	6	11	15	18
III. " (Physical Geo.)	14	30	31	16
IV. " (History of Geo.)	8	14	18	18
V. " (Statistics.)	5	24	26	28
VI. " (Didactical Geo.)	9	17	28	42
VII. " (Voyages & Travels)	10	10	12	21

The following is a summary according to countries:—

	Letters of Distinction.	1st Class Medals.	2nd Class Medals.	Diplo-mas.	Total.
France	10	28	43	75	156
Russia	12	17	21	14	64
Austro-Hungary	6	20	16	8	50
Germany	3	9	3	10	25
Sweden	3	11	5	6	24
Italy	3	8	7	7	25
Netherlands	5	2	10	7	24
England	7	3	4	8	22
Switzerland	4	5	7	4	20
Belgium	2	4	4	4	14
Denmark	2	4	7	1	14
Norway	3	2	2	7	14
Portugal	1	4	5	3	13
Spain	3	1	6	3	13
United States	2	3	2	—	7
Turkey	1	—	2	2	5
Argentine Republic	1	1	—	1	3
Luxemburg	—	—	1	1	2
Chili	—	—	1	1	2
Japan	—	1	—	1	2
Brazils	—	—	—	1	1
Columbia	—	—	1	—	1
Egypt	—	—	—	1	1
Hawai	1	—	—	—	1
TOTAL	69	123	147	165	503

In addition to the above, Letters of Distinction were awarded to all the Alpine and Tourist Clubs, and the "Executive Committee" voted a special Letter of Distinction to the authorities of the Cambodian Museum, at Compiègne, and gold medals to MM. Payer and Weyprecht.

Khokand.—The insurrection in Khokand, which led to the flight of Kvodoyar, the khan raised into power and supported by Russia, may possibly lead to an extension of Russian territory. The rebels, incited by their priests, crossed the frontier and surrounded the Russian towns of Khojent and Uratube. The garrisons, however, made a stout defence, and enabled the Russian authorities to hasten to the relief of these places. Several skirmishes have been fought, and a battle of some importance took place under the walls of Makhram, a Khokand town on the Syr-Darya, where 30,000 enemies were defeated on the 3rd of September by the Russians led on by General Golovachef. The Khokandis lost 39 guns. General Golovachef, having received reinforcements continued his advance upon Khokand, and occupied that town on the 16th of September.

* Generalkarta öfver Jernvägs Kommunikationer inom Sverge, Norge och Danmark, sammandragen af A. Hahr. Scale 1:1,000,000, 6 sheets. Stockholm, 1875.

Colonel Gordon.—Colonel Gordon is progressing steadily in his systematic plans for exploring the African lake region. He had passed several vessels above the cataracts in latitude $4^{\circ} 38' N.$ after great labour; and he expects to be able to form a line of river stations, by passing the cataracts of Makédo, and keeping vessels on the long intervals of navigable water between each cataract.

Abyssinia is still a prey to anarchy. Tigre and the eastern provinces are under the government of Kasa, who was crowned some years ago, and goes by the name of Johannes. His efforts to gain a footing in Amhara and in the southern provinces, including Shoa, have always proved abortive. Some time ago, when Kasa had taken the field against Menelek, king of Shoa, a nephew of the late king Theodoros, named Lej Ubié, placed himself at the head of the discontented parties, and rapidly gained possession of Dembea, Koara, Bagemder, Wogara, and other provinces of Abyssinia.

German African Society.—The reports from the expedition despatched by this Society to the West Coast of Africa are not as favourable as could be desired. Dr. Güssfeldt, having collected a large body of carriers, left Chinchoxo in May last, but sickness amongst the carriers compelled him to return to the coast. The station, established at a considerable expense, will be abandoned, and the members of the expedition are on their way back to Europe. Dr. Güssfeldt has already reached Berlin. The second detachment, commanded by Captain von Homayer, appears to have met with greater success, though its leader has been compelled to resign the command on account of illness, and is on his way back to Europe. Dr. Pogge, Dr. Lasaulx and Lieut. Lux, are reported to have reached Kasanje in the company of an ivory-dealer, named Saturnino, and are now on the road to the capital of the Matiamvo. They propose thence to proceed to Lucenda. Dr. Lenz, who is on the Ogowé, has again left for the interior.

Ecuador.—The little South American Republic of the Equator, the old Spanish Captain-Generalcy of Quito, is, geographically, a very interesting region, containing many unmeasured mountain peaks and wide tracts of unexplored forest. It is familiar to the general reader through the charming writings of Humboldt, and is memorable, in the annals of science, from the measurement of an arc by Condamine and the Ulloas. For the last fifteen years this little Republic has groaned under a despotism akin to that endured by Paraguay under Dr. Francia. The despot of the Equator, Dr. Don Gabriel Garcia Moreno, was a man of considerable ability, but a fanatical bigot of the most retrograde kind. He stamped out every sign of freedom, and filled the unhappy country with armies of greedy Jesuits, monks, and nuns. It is true that he constructed some good roads, and executed other public works; but he failed as a financier, and while neglecting to pay any dividend on the foreign debt of the country, he sent the Pope an annual present of \$20,000.

On the 6th of August President Garcia Moreno was assassinated by a Columbian named Rayo, in the corridor of the Public Treasury at Quito. The Vice-President, Don Manuel Gomez de la Torre, succeeds according to law; but there are sure to be disturbances,

and if the Jesuits and foreign monks are wise they will take their passages in the first steamer.

We trust that the removal of this incubus may lead to a better state of things in Ecuador. It is impossible not to feel hope for a country which produced such men as General Rocafuerte and the poet Olmedo in a former generation; and which now boasts of a patriot such as Juan Carbo, and a thinker like Juan Leon Mera, whose work on the literature of Quito we reviewed at p. 350 of the number of *Ocean Highways* for February 1873.

Obituary.—DR. OSCAR PESCHEL, Professor of Geography at the University of Leipzig, died on the 31st of August, after a protracted illness and much suffering. The deceased was born at Dresden, on the 17th of March, 1826. He studied law, but at an early age turned his attention to journalism, and for a number of years was sub-editor of the *Allgemeine Zeitung*, one of the most respected German newspapers. On the death of Dr. Wiedemann, he was appointed editor of the *Ausland*, which attained a high degree of popularity under his able management. Dr. Peschel was a man of great learning and original thought. In addition to numerous geographical papers published by him in the *Ausland*, most of them bearing upon historical and physical geography, we are indebted to him for a *History of Geography*, a *History of the Age of Great Discoveries*, *Problems of Geography*, and a work on *Mankind*. The last has recently been translated into English.

DR. KARL ANDREE, editor of the *Globus*, died on the 10th of August at Wildungen, aged 67. He was born at Brunswick, on the 30th of October, 1808, and studied at Jena, where he became one of the most enthusiastic members of the "Burschenschaft." His political conduct had made him "impossible" as a university professor, and he turned his attention to journalism. In 1838 he became editor of the *Mainzer Zeitung*, and subsequently he edited the *Oberdeutsche*, the *Kölnische*, the *Bremer*, and the *Deutsche Reichs-Zeitung*. In 1849 he retired from journalism in order to devote the whole of his time to geographical studies. The first result of his leisure consisted in a work on America (Brunswick, 1850), and many of his subsequent publications had reference to that continent and to the question of emigration. In 1863 he published a *Commercial Geography*, and since 1861 he has edited the *Globus*, a geographical periodical. Dr. Andree was a man of great research and of indefatigable industry, an elegant writer, and a man of strong convictions. He has been succeeded in the editorship of the *Globus* by his son, Dr. Richard Andree.

Correspondence.

MR. SKERTCHLY ON THE OGOWE.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I am sorry to find that Mr. Skertchly has such a short memory on some subjects, whilst it appears to be so good on other matters. Of course it would scarcely be polite to contradict him, in the face of his assertion that I gave him *no* information respecting the Ogowé. I will therefore simply state that I have the most distinct recollection of conversing with him about that river,

and of informing him that I had heard, from natives of the Mlenga and other tribes, of a mountain which was said to throw out smoke. I had previously, in 1866, communicated the same information to the Royal Geographical Society, and was then under the impression that an active volcano existed near the Ogowé; but in January 1873, when I saw the mountain in question, called Otombi or Motombi, I found that I had misunderstood the natives, as it is certainly not an active volcano, although it may be an extinct one: however, whether I gave Mr. Skertchly such information or not, is a matter of no importance.

The name Oblimba is certainly unknown anywhere in the vicinity of Gaboon; and I was not before aware that Mr. Skertchly, during his first excursions in the interior, could by any possibility have gone so far to the "eastward of the high land wherein the river Rembwé takes its rise," as to have been at all near the route "to the Congo mouth;" and I think it would astonish anyone knowing the country, and the nature of Mr. Skertchly's excursions, to learn that he had fallen in with anyone, whether of "Arab descent" or otherwise, who was making a journey with "slaves and ivory" from such a quarter to the Congo, as that river is entirely unknown to any of the inhabitants of the interior immediately eastward of the Rembwé.

"Finally as to the Arabs," Mr. Skertchly must have been more fortunate than anyone resident in the Gaboon country for a much longer period than he professes to have been therein, if he ever encountered there either "Arabs" or "men of Arab descent;" as I can affirm without fear of contradiction, and can appeal to persons now resident in England as to the truth of my assertion, that the only two men who occasionally made the journey between the Gaboon and the Ogowé, and who resided more than a mile from my factory, and not "within a few yards" thereof, were *not* Arabs, but simply negroes from the Senegal, named respectively Kerno-Mahmadon Seydon, and N'Diaye or Njaï; the former of whom is still alive and resident in Gaboon, whilst the latter lost his life some three years ago by an explosion of gunpowder in his canoe, during a trading trip up the Ogowé. Therefore, I think I am justified in saying that either Mr. Skertchly's memory or his imagination has misled him, as I am confident that neither he nor anyone else ever heard of Arabs in Gaboon, by report, much less saw two of them "within a few yards of my factory" at that place. I am writing by the 'Monrosia,' on the 18th inst., and shall not fail to apply to residents at Gaboon as to the correctness of my statements, which, moreover, can be confirmed by Messrs Holt and others now in England.—I am, sir, yours faithfully,

R. B. W. WALKER.

To the Editor of the "GEOGRAPHICAL MAGAZINE.

SIR,—Reading to-day Mr. Major's account of the voyages of the Brothers Zeno, I was struck with the passages at pp. xxviii and xxxiii relative to the conflict that Nicolo relates as having taken place between the inhabitants of Stromoe, Faëre Islands, and Zichmni.

In 1872 I spent more than six weeks in those islands, visiting each one, with the exception of Fugloe, the most northern (on account of bad weather). On one occasion walking from Kalbak fiord to Thorshavn, and not far from where the Norderdahl track unites, my guide showed me a stone, and volunteered the statement that it marked the spot where the inhabitants of Thorshavn had given battle to an enemy. Further information I could not procure from him, only that the battle took place a long time ago.

H. W. FEILDEN.

H. M. S. 'ALERT,' OFF CAPE FAREWELL.
25th June, 1875.

Proceedings of Geographical Societies.

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BRITISH ASSOCIATION.

SECTION E.

Thursday, August 26th, 1875.

AFTER the reading of the President's Address, which appeared *in extenso* in our last number, Captain H. H. TOYNBEE, read a paper "On the Region of the Equatorial Calms of the Atlantic." He exhibited and explained a series of diagrams which he had prepared in co-ordinating a series of about 70,000 observations, made by various naval commanders on the winds, currents, temperatures, &c., of the equatorial zone of the Atlantic. These diagrams may be said to give the navigator a monthly picture of the doldrums, clearly showing him how, in some months, they are wedge-shaped (as remarked by the late Commodore Maury), and enabling him to select the best route across the equator. They also illustrate the action of both air and water when meeting, as is constantly the case with the two trade winds; showing also how the air as well as water seems to eddy round a point of land from which the main stream is running. The specific gravity of the currents due to the N.E. and S.E. trades, as well as that of the Guinea currents, is also given. The district is the birthplace of many West Indian hurricanes, and the place in which one originated was pointed out on the diagram for August, it having been afterwards traced to the island of St. Thomas. Besides many other allusions to remarkable and unsettled weather, reference was made to two earthquakes which were experienced by ships in the district. It was explained that the paper was a *résumé* of a larger work shortly to be published by the Meteorological Office.

Dr. CARPENTER called attention to the remarkable fact that in the equatorial Atlantic, even in the month of August, they had no higher temperature than was often found to prevail in the Mediterranean. The temperature in the equatorial waters was 79°; whereas in the Mediterranean it was often higher.

The PRESIDENT said the diagrams and figures were wonderfully harmonious and extremely accurate. The results were really very valuable.

Captain TOYNBEE pointed out, in reply to Dr. Carpenter, that August was the depth of winter at the equator, and that that was the period when the lowest temperature would prevail. In April the temperature would be higher.

Dr. CARPENTER.—I referred to the general fact that the temperature of the water there never exceeds 80 degrees in any season.

Captain TOYNBEE said the reason of the cold water seemed to be the large amount of water thrown up by the southern winter towards the equator, and the cold there was the cause of many of the westerly gales.

THE CRUISE OF THE 'CHALLENGER.'

Mr. JAMES CROLL, read a paper "On the 'Challenger's' Crucial Test of the Wind and Gravitation Theories of Oceanic Circulation." The researches of the 'Challenger' brought to light the striking fact that the general surface of the North Atlantic to be in equilibrium must stand at a higher level than at the equator. The surface is lowest at the equator, and rises with a gentle slope to well nigh the latitude of England, a result which proved the physical impossibility in so far as the North Atlantic was concerned of any general interchange of equatorial and polar water due to gravitation. The results of the researches were all against the gravitation theory. The warm water was all in the North Atlantic, and little or none in the south—a condition of things the reverse of what ought to be according to that theory.

The thermal condition of the Southern Ocean, as ascertained by the 'Challenger,' appeared also irreconcilable with the gravitation-theory, the very fact that a mass of water, 200 fathoms deep, extending over 15 degrees of latitude, remaining above water of three or four degrees higher temperature showed how little influence difference of temperature had in producing motion.

Dr. CARPENTER followed with his paper "On the bearings of Recent Observations on the Doctrine of Oceanic Circulation." He said he thought that nothing could be plainer than that there was a great system of horizontal circulation, more on the north than on the south of the equator. In the north that circulation was complicated by the fact that a large portion of the equatorial current goes into the Gulf of Mexico, and issues forth as the Gulf Stream. He felt convinced, however, that there was a large portion which never goes into the Gulf of Mexico at all. There was a large portion reflected from the West India Islands and the peninsula of Florida. He considered that this portion was the source of the thick layer of warm water referred to by Mr. Croll. They knew little or nothing of the great basins of water, but he had ventured to predict that it would be found that the temperature of the North Atlantic would be below 40 degrees. That was verified. He had also predicted that the lowest temperature would be found in the South Atlantic, and it had since been ascertained that the temperature in the South Atlantic was below 35 degrees. He could not account for the warmer water near the barrier of ice unless brought there by a force which draws it into the Polar area.

Sir WM. THOMSON urged that investigation should be made into the circumstances under which the cold and warm currents meet. He cordially pronounced in favour of the soundness of the views held by Dr. Carpenter.

Friday, August 27th.

THE PAMIR STEPPE.

THE first paper was by Colonel T. E. GORDON, a member of the scientific staff who accompanied Sir Douglas Forsyth on his late mission to Kashgar, "On the Exploration of the Pamir Steppe,"* which gave many valuable details of the observations on the central watersheds, &c., of Asia, the hot-springs, the lakes, and the waste lands.

THE PRESIDENT pointed out that the Pamir Steppe was the centre point from which their observations of the geography of Central Asia could be most conveniently made. The energetic labours of the gentlemen of the exploration had thrown a great deal of light on the subject.

Sir RUTHERFORD ALCOCK said the paper ought to be carefully studied with map in hand. The tract of country was becoming every day now of greater importance from the advance of Russia, and it behoved them to thoroughly understand the geography of the region and what were the points of the greatest advantage for merchants and armies.

Sir H. RAWLINSON observed how much the Geographical Society appreciated the explanations of Colonel Gordon, who had demonstrated the inaccuracy of the old prophecy that the first time Cossack and Sepoy met would be on the field of battle. Colonel Gordon had not only crossed the intervening tract, but had passed over the Russian frontier. He agreed with what had been said with regard to the extension of commerce. It was that which had, in fact, stimulated the Government to make the explorations, and not with a view to any warlike enterprises. What they aimed at was the extension of the peaceful arts of commerce, and scientific and geographical knowledge.

Colonel MONTGOMERY, of the Trigonometrical Sur-

vey of India, followed on the map the routes of different explorers and the surveys made. There were still regions of which they knew nothing. They knew nothing of the Terek Pass, but his explorers were still trying to find a route through the great mountain ranges extending peak after peak for thousands of feet in height beyond the Mustagh Range.

Sir RUTHERFORD ALCOCK asked under what government were the natives of the region?

Sir H. RAWLINSON said they were quite independent. He wished to point out that, if a letter which had been received was correct, the Terek Pass was not so unknown as was supposed. It stated that the writer, on his way from Kokhand to Kashgar, had crossed the Terek Pass, and if that were so, he was one of the most wonderful of European travellers. The writer, a Belgian, rejoiced in the name of "Romulus Bonhomme."

THE TURKOMAN FRONTIER OF PERSIA.—THE OXUS.

Sir H. RAWLINSON gave a sketch, illustrated by maps, of an elaborate paper by Capt. the Hon. G. Napier, "On the Turkoman Frontier of Persia." The important position of Merv was descanted upon. The town itself was a mere collection of huts at present, but round it centred great political interest, because there could be no doubt the position was of the greatest importance. The points in dispute between the Russians and the Turkomans were pointed out, and the investigations of the Hon. G. Napier, who had zigzagged about along the Russian frontier and among the Turkomans, were valuable from several standpoints. The geographical interest centred in the tracing of the old bed of the Oxus, which was altogether different from that which the Russians were now taking such pains to explore. Capt. Napier had also thrown light on ancient geography, and when his discoveries were properly worked out they would throw great light on this part of Central Asia. He was also very accurate in fixing all the lines of route from the Caspian to the East; and Sir Henry pointed out the course which the Russians would take if they ever occupied the tract of country with which the paper dealt. He also pointed out that the Russians would have no difficulty in establishing through-water communication to the centre of Asia—to Turkistan on the one hand, and to the foot of the Hindoo Kush on the other.

A paper by Major H. WOOD, who accompanied the Russian expedition, "On the Probable Cause of the Change of Direction which has occurred in the Lower Course of the Oxus," by which its mouth has been directed from the Caspian to the Aral was next read. He attributed the change to abstraction of its waters for purposes of irrigation, especially in Khiva, where there was great waste of the water, owing to a defective system of irrigation. If the river had not been thus interfered with, it would have continued its course to the Caspian, but owing to the artificial means used to abstract the water, in course of time the sand banks which would be formed would prevent the Oxus flowing so far.

Dr. RAWLINSON said, with regard to Merv, although now a mere cluster of huts, twice in the history of the world it had been a place of great importance. First, when the Aryan race came down from its highland home it settled in Merv; and again, subsequent to the conquest of Alexander, Merv was a place of great importance, and was occupied by the Greeks. As to the course of the Oxus, it was said that if the Oxus had debouched where the Attrek now enters the Caspian in the time of the Parthians, it would explain much that was at present difficult to understand in the career of that people. What was understood as the seat of that nation, the mountainous districts on the south-east of the Caspian, was much too confined and poor a country to supply the vast resources in men and means which the Parthians displayed when they carried their conquering arms to the Mediterranean, and disputed the empire of the East with the Romans. But if in those

* See *Geographical Magazine* for July 1874, p. 139; also p. 257 of our last number.

times the Oxus debouched at the Attrek, and a vast tract of what was now sandy desert was then a well-irrigated, fertile, and populous region, forming part of the Parthian territory, the mystery would be explained.

THE SAHARA DEPRESSION.

General Sir ARTHUR COTTON next read a paper "On the Project for letting the Waters of the Atlantic into the El Juf Depression of the Western Sahara." He said one of the most remarkable signs of the times was the extraordinary interest now taken in the opening up of Africa. Timbuctoo was the central point of North-West Africa, and many years ago the project of a direct line of trade with Timbuctoo was entertained, although the possibility of letting in the sea to the depression did not seem to be entertained. The existence of the depression was, however, frequently noted, and there could be no doubt that at one time—though a great many years ago—the depression was an arm of the sea. He could not account otherwise for the encrustation of salt which was found in it. He pointed out the great traffic which might be carried on with the great masses in the interior, who wanted our manufactures, if the sea were restored to its former bed in the Sahara, and contradicted on authority the idea that the tribes of the desert were wild and savage; they could give in return for our goods gold, ivory, gums, and other rich products. Multitudes of men now unknown would be brought into trading relations with England if the sea were restored up nearly to Timbuctoo, and a canal cut from the Niger to meet the sea. He sketched the limits of the depression, which was 10 miles broad near the sea, and some parts of it were below even the level of the sea. He also commented on the remarkable fact of the absence of any watershed to the Niger at Timbuctoo. He thought the scheme of opening up Africa by means of restoring the Sahara depression to the sea was well worthy of careful consideration, and especially of England. A grander and more interesting subject could not be imagined; and after the small expedition had made an exploration, they would have to consider whether they should go to the expense of about 10,000*l.* to have a complete examination of the undertaking.

Mr. GALTON said Timbuctoo was a place of no importance whatever. It was 1500 miles from the mouth of the Niger, and must be 1000 feet at least above the level of the sea. The making of this lake meant cutting a channel four times the size of the Volga, from an unknown distance, and, after all, to reach Timbuctoo.

Canon TRISTRAM considered that the formation of the lake would require more water than man, by any known appliances, could pour into it. He rather liked the Sahara, and considered the project a rather revolutionary proceeding in physical geography.

Professor HENNESSEY said if the Sahara was flooded—if it were possible to flood it—the conclusion he arrived at was that it would not injure the climate of Europe, and that it would benefit the climate of Western Asia.

Dr. BROWN said that for many years Timbuctoo was considered a central point of great importance.

Dr. NACHTIGAL, the well-known African traveller, also spoke favourably of Timbuctoo. As to its being 1000 feet above the sea, he pointed out that this was not unusual, as Lake Chad was 800 feet above the level of the sea.

General COTTON said that of Timbuctoo being an important commercial centre there was no doubt whatever, and near it there were great masses of population which were not now reached. As to the height of Timbuctoo, one traveller spoke of it as 700 feet and another spoke of it as 800 feet, and there was no reason to doubt it. There was no question of flooding the Sahara—only a small portion of it; and the question was whether they should go to a small expense to decide the practicability of the scheme?

Sir HENRY RAWLINSON said until they knew more about the levels it was useless to discuss the matter scientifically; but they must all feel gratified at the

project, although some of them might question the feasibility. It was not fair to pooh-pooh the subject; and on behalf of the Geographical Society he said they should be happy to have some additional scientific information.

Monday, August 30th.

LAKE CHAD TO THE UPPER NILE.

Dr. NACHTIGAL read a paper on an expedition from "Lake Chad to the Upper Nile." The expedition practically began in 1869, and the following year, after a very painful and dangerous journey, he arrived at Bornu. Travelling from this point with a band of Arab robbers, he escaped for a time further perils, and ultimately was enabled to trace the remarkable water system of the Chad Lake. The lake covers an area of about 10,500 square miles. Its form is that of an irregular triangle, the base of which extends from W.S.W. to E.N.E. Two-thirds of the interior are occupied by land, and on the central islands live the Budduma, on the east the Kuti, and the north-east the Kanembi. Dr. Nachtigal considers it a fact that the waters of this great lake are not due altogether to the rainfall or to the neighbouring streams, but that a great part of them come from a great distance. It was especially noticeable also that there was no outlet to the lake. Dr. Nachtigal mentioned, in conclusion, a variety of interesting details as to the character of the natives, and urged repeated expeditions to this part of Africa in order to open up the way to a peaceful and profitable commerce, and to the enlightenment of an interesting and energetic people.

Mr. GALTON pointed out that Lake Chad was a very small lake, and yet it required a vast quantity of water to keep it from being dried up. He left this fact for the consideration of those who had heard General Cotton's paper on the proposal to inundate the depression in the Sahara. He only regretted that this paper had not been read immediately after General Cotton's.

The PRESIDENT asked if the reader of the paper knew sufficient of the country to the west of the depression which comes out of Lake Chad to say if there was any possible egress to the north or north-east?

Dr. NACHTIGAL said it was reported there was an egress.

Sir H. RAWLINSON said apparently there was another lake to the north to receive the outflow from Lake Chad. He presumed whatever salt was brought down to the lake was lost by drying up and then re-flooding. That was how they explained its freshness. On behalf of the Geographical Section he wished to recognise the great services rendered by Dr. Nachtigal. He had succeeded where others had failed, and his great services had been recognised by all the nations of the Continent.

LAKE NYANZA.

A communication was then read from Lieut. W. H. CHIPPENDALE "On the Journey beyond the Cataracts of the Upper Nile towards Lake Albert Nyanza." The party left Duffelé, about 7 miles above the cataract of the White Nile, on the 26th of February last. The first station on the route was Gaifi, which was left next day. Faloro was reached in two days, whence the party was escorted by a chief. The country was intersected with hills and glens, and was very picturesque. Some of the chiefs refused to visit the expedition, saying they had been pillaged and were ashamed to come. In Erraya the people were not timid, but thronged round the camp of the travellers. Leaving this place, the party passed through a country of high grass and low scrub trees. Owing to the height of the grass no observations could be made, but it was noticed that as usual there were very many watercourses. Some of the rivers were so full that great difficulty was experienced in crossing them. At one point, food failing, the chief and the porters wished to return, but this was not listened to. All the banks of the river were lined by gigantic tropical vegetation. The

majority of the natives were naked; a few wore skins of goats slung round their loins. They nearly all wear a ring through the upper lip, and the colour of the natives was very various—from black through all shades to coffee colour. The chief of the Koshi visited the party, who did not want to go into the interior, as a terrible scourge of smallpox was prevailing. The chief told them his territory extended as far as the shores of the lake, about three days' easy marching. He also informed them the river higher up split into two branches, which he seemed to regard as two rivers. The one he said came from Magungo and belonged to Kaba Rega; the other came from the great lake, and by it it is always possible to enter the lake. This tale about two distinct rivers they had heard before. Probably there was a large island at the entrance of the lake, which would account for the two rivers flowing from the same lake.

Sir H. RAWLINSON said the paper was of great interest, inasmuch as it was the only information they had of the district since Sir Samuel Baker penetrated the region. Taken in connection with that mission of Sir S. Baker, he must say the paper raised considerable doubts in his mind as to the lake, which was one of the geographical puzzles of the day. Livingstone's idea was that his great Lualaba flowed out of the lake into the Nile, but geographers had found that that was utterly impossible. It made them all the more anxious that Colonel Gordon should thoroughly explore the south-eastern and southern borders of the lake, and probably before the British Association met next year the mystery might be cleared up.

EXPLORATION OF THE AURES MOUNTAINS.

Colonel R. L. PLAYFAIR read a paper on the "Exploration of the Aurés Mountains," a comparatively unexplored range in North Africa. The paper gave a history of the region and the peoples by which it was from time to time occupied, extending back to the earliest times. The natives were clearly of European descent; many Latin words were used by them, and they kept the 25th of December as a feast-day. In the valleys between the mountains there were many rivers on the southern side. On the north side the slopes were more gradual. The natives of all classes lived in stone houses, and the district might be made a valuable wool-producing country. The women were of singular beauty, and never concealed their faces. There was a great extent of cedar forests, and lead was to be found in abundance. Roman remains were to be met with in all directions, and they indicated a high state of civilisation at the time the Romans made a lodgment in the region.

DACOTAH TERRITORY.

Colonel H. C. CARRINGTON, United States Army, read a paper "On Dacotah Territory." He observed that the geographical and physical features of this tract, which is being rapidly carved into several large states, each of nearly 100,000 square miles, were long neglected by the American people. The geography of Dacotah is now under a more careful revision, as troops have been sent to protect Indians from the white encroachment, and examine the country. *Mauvais terres*, or bad lands, constitute the larger portion of the surface, while the valleys that fringe the rivers are often of matchless fertility. Lake De Smedt is bordered by exorice and volcanic *débris*, and its water is alkaline and useless. Almost in the centre of the territory is the region of the Black Hills, an exceptional group of peaks and ranges, surrounded on all sides by bad lands. Upon the completion of the Pacific railroad a compromise was made with the hostile Indians, the Big Horn country was abandoned, and its rich valleys, as well as the country of the Black Hills, were given to the Indians for free occupancy. These hills are drained by the forks of the Big Cheyenne River. Within this encircling group or mountain chain is embraced all of the new Eldorado which is now challenging the aggression of adventurers. The Yellowstone River, flowing from the Yellowstone Lake, and

the marvellous volcanic region adjoining, is a large tributary of the Missouri. The country is fine for barley, but too cold for corn. There is no limit to the pine timber, but all other timber is scarce and hardly fit for fuel. Sage brush and cactus predominate, except in the valleys, and, independently of the questionable gold element, there is little to attract a worthy emigrant. No extensive deposits of ores have yet been found.

PHYSICAL GEOGRAPHY AND PRODUCTS OF SOUTH AFRICA.

Dr. J. C. BROWN read a paper on the above subject. He said that apparently the whole of South Africa had been upheaved in a mass, but differences of soil were indicated by the products—lignite, coal, copper, gold, rubies, and diamonds—which were found in different localities. Formerly forests prevailed to a greater extent than at present. The inhabitants were to a great extent pastoral, but the progress was tending towards agriculture, and labour was being attracted by the diamond and gold fields. Capital was increasing, railways were rapidly extending, and there was much water now escaping to the sea which in future no doubt would be utilised.

Tuesday, August 31st.

A crowded meeting assembled to hear read the report of Mr. CLEMENTS MARKHAM on the Progress of the Arctic Expedition. We would respectfully refer our readers to the second article, p. 292 of the present number for a full account of the progress of the expedition and the return voyage of the 'Valorous.'

Mr. KEITH JOHNSTON then gave an interesting account of his recent journeys in Paraguay, part of which appeared in our last number, p. 264, and will be found continued at page 308 of the present number.

The PRESIDENT said if gentlemen had read Mr. Keith Johnston's paper before speculating in the Paraguay loan, they would not have spent twopence instead of two millions in regard to a country in the deplorable condition of Paraguay.

TRADE ROUTES TO WESTERN CHINA.

A paper by Colonel YULE "On Trades Routes to Western China" was then read. The field with which the paper dealt was the region in which the great southern rampart of the Tibetan plateau, which in India was called the Himalaya, passing beyond 100° of east longitude, approached its eastern limit, whence it broke up into a vast radiation of terminal spurs which eventually sink into the great alluvial plains of China and Indo-China, or else run onward to the sea. Attention was briefly called to the different races occupying this region: the Chinese, the Shans, Singphos, Talains, and the Palaungs. From Tali towards the Burmese capital one chief road ran direct; the rest made westward for the nearest points of the Irawadi at and about Bhamo. The direct road was that by Thein-ni, formerly the seat of a considerable Shan principality. The paper further went into elaborate details of the geography of the regions.

Sir H. RAWLINSON said that the paper supplied most valuable information with regard to a region which, in view of a conflict with China, possessed great interest for Englishmen at the present moment.

GLACIERS OF THE WESTERN HIMALAYA.

Colonel MONTGOMERY gave a full description of the gigantic glacier system of the Himalaya Range, which reaches its greatest development in Balistan, in North-western India. The paper was illustrated by a number of superb maps and pictorial views of glacier scenery. The glaciers gradually increase in size from east to west, and in the Mustagh range are in many cases more than 20 miles in length, the largest being Biafo, 34 miles long. The thickness of the ice was in some cases found to be 400 feet. The result of experiments showed that the general phenomena as to motion, &c., were identical with those of the glaciers of the Alps.

The business of the section was brought to a close on the reading of a paper by Mr. DELMAR MORGAN "On Prejevalsky's Journey through Mongolia," which will be found at p. 305 of our present number.

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PARIS GEOGRAPHICAL SOCIETY.

Bulletins for June and July.

M. MALTE-BRUN gives in the *Bulletin* for June a brief notice of the comparative state of our geographical knowledge of the earth's surface, illustrated by a map, in which the countries surveyed are coloured a deep red, lighter shades being used to denote lesser known countries, while *terra incognita* are left white. Europe appears uniformly red, portions of Finland, Lapland and Turkey being alone unexplored. The lesser known regions of Asia comprise tracts of Northern Siberia, parts of Central Arabia, Baluchistan, Indo-China, Tibet, and Mongolia, while the unknown parts are some portions of Northern Arabia, Eastern and Great Tibet, and Eastern Siberia. In Africa, a vast region extending between Lakes Chad and Tanganyika and from the basin of the Bahr-el Ghazal to that of the Ogowé is still unknown, as well as parts of the Galla country. Parts of Northern America, the northern half of Labrador, Alaska, with the exception of the course of the Yukon and a few Islands, the interior of Greenland, and of the countries bordering Smith's Sound, are left uncoloured, as well as tracts of country contiguous to the sources of the Amazon and the Rio de la Plate, and in the interior of Patagonia and Tierra del Fuego, several portions of the Eastern Archipelago, notably the interior of New Guinea, and to a certain extent, that of Australia also. The Polar regions of course still offer the most extensive scope for exploration. The general aspect of the still unknown regions of the earth's surface appears to offer plenty of work for geographical science for many years to come.

THE MACKENZIE RIVER AND ARCTIC NORTH AMERICA.

In the July *Bulletin* of the Paris Society, we are presented with a new and valuable map, by M. l'Abbé Petitot, of the course of the lower Mackenzie River and the country adjacent to the Great Bear and Great Slave Lakes. This region was traversed by the Abbé, while engaged on his missionary labours, during a period of eleven years, between 1862 and 1873, and his map shows the value of his researches, being most carefully elaborated and covered with a perfect network of his own routes.

As we have previously mentioned,* an interesting paper on the subject was read by M. l'Abbé before the Society, on the 20th of January last. The Abbé is evidently jealous of his country's renown, and he did not fail in the course of his lecture to set forth the deeds of Frenchmen and French Canadians, coupled with frequent expressions of regret, that this field of enterprise had been snatched from their country's grasp.

M. l'Abbé commenced his paper by giving a short *resumé* of the earliest explorations of the French and English in this region, starting with Champlain's expedition to the Ottawa and Mattawan Rivers in 1615.

In speaking of the discovery of the Great Slave Lake by Peter Pond, in 1780, he mentioned the interesting fact that in the course of his travels he had met with a French half-bred, named Francois Beaulieu, who subsequently died in 1872, at the age of about 100 years, and who remembered well the advent of the first Europeans, who must have been either Peter Pond, in 1780, or Sir Alexander Mackenzie, in 1789.

M. Petitot also enumerated the names of several travellers, who by their researches in various parts of this region, had contributed geographical information, which is not to be found on existing maps. Among these Mr. Bell, about the year 1840, was the first Euro-

pean to penetrate into Alaska, from the Arctic side of the Rocky Mountains, a journey subsequently repeated by M. Petitot and others; Messrs. M'Dougall and M'Donald descended the Yukon to its mouth in Behrings Sea, between 1864 and 1870; Mr. Campbell explored, about 1848 or 1850, the Pelly and Lewis Rivers and the sources of the Yukon, and built Forts Francis and Pelly. His discoveries are only roughly indicated on the best maps. In 1859, Roderick Macfarlane discovered to the north-west of Fort Good Hope, of which he had charge, a river, running parallel to the Mackenzie, which he named Anderson River, and a few years after, another stream still further eastward, which M. Petitot has named after its discoverer. Lastly, in 1862 or 1863, M. Arnott traversed in an Indian bark canoe, the intermediate region lying between the Mackenzie and Anderson Rivers, and 67° 30' and 68° 30' N. latitude.

The Abbé then proceeded to describe his map, which embraces the basin comprised between the Coppermine River and the Rocky Mountains to the east and west, and the Great Slave Lake and the Frozen Ocean to the south and north. Owing to the great difficulties of carriage, he was unable to obtain any instruments but a watch and a compass. This obliged him to rely on Franklin's fixed points, and he has accordingly refrained from modifying to any great extent the general direction of the Mackenzie River, the Rocky Mountains, the configuration of the Arctic shore, and the position of the Great Bear and Slave Lakes. He arrived at a rough idea of his longitude by calculating the difference between the time of the sun's rising and setting with that at Fort Good Hope, which he knew to be 5H. 8M. behind Greenwich. For heights he has relied mainly on those observed by Richardson and Franklin, adding his own eye-measurements of the mountains which rise from the basin of the Mackenzie to theirs taken at various points along the plain through which the river flows. M. Petitot remarked that the greater part of the country traversed by him was composed of vast dreary plains of frozen wastes, bleaker even than those of Siberia, and of wild and stunted forests such as are only to be seen in extreme latitudes, but that he nevertheless learnt to conceive an affection for the country.

The results of M. Petitot's labours may be summed up as follows:—1. A survey of a large portion of the country between the Great Slave Lake and Great Bear Lake to the south and north, and Franklin's route in 1810 and the Mackenzie to the east and west, in the course of which several discoveries were made, one being the examination of Lake de la Martre, on the 63rd parallel of latitude, the existence of which Franklin had learnt from natives, but had been unable to visit. 2. A detailed survey of the mountain system on the right bank of the Mackenzie. 3. An examination of the topographical features of the country between the Great Bear Lake, the Mackenzie River, and the Arctic Ocean. This region, which was explored in every direction by the Abbé at intervals during a period of ten years, has been most completely surveyed. He satisfied himself that the river, the mouth of which was crossed by Richardson on the 10th August, 1848, was not the Anderson, but that one further east which he had called Macfarlane River. He examined also Esquimaux Lake, the existence of which had been announced by Franklin, but subsequently contested by Richardson. 4. From 1865 to 1873 M. Petitot traversed, in company with several Indians, the country to the east and north-east of Fort Good Hope, visiting the Great Bear Lake by different tracks no less than eight different times. The steppe between the Anderson and Macfarlane Rivers is covered with lakes, the outlets of which are, in the Abbé's opinion, indubitably subterranean. In 1869, in crossing the Great Bear Lake, in the month of May, Père Petitot fell through some crevasses in the ice on no less than three occasions, narrowly escaping death by drowning each time, while soon after that on Bear River, the stream being encumbered with ice

* *Geographical Magazine* for July, 1875, p. 222.

at the time, his canoe capsized and he and an Indian owed their lives to being fortunately thrown on a sandbank. In 1870 he visited Fort Yukon, which is situated close to the Porcupine River, the northern tributary of the Yukon. The return journey was made in company with some Esquimaux who followed the Abbé as far as his residence at Good Hope. 5. A thorough exploration of the course of the Mackenzie made in the course of ten journeys between the Great Slave Lake and Fort Good Hope, eight between the last-named place and the mouth of the Mackenzie, and twenty-two between Forts Good Hope and Norman. Without venturing to take away from Sir Alexander Mackenzie the honour of having discovered the stream named after him, M. Petitot ascertained that various localities had received French names, presumably from the French half-breeds settled in the country, while the Mackenzie itself is better known under the name of *La Grande Rivière* than any other. 6. A few modifications have been introduced in the configuration of the Great Slave and Bear Lakes, the recesses and bays of which have been all carefully explored, some for the first time. 7. The lower course of the Peel River of Franklin has been rectified by M. Petitot, who has ascertained that one channel joins the Mackenzie, while the other debouches into the Arctic Ocean. It was this latter one that Franklin ascended under the impression that he was ascending the Mackenzie. 9. The last of M. Petitot's achievements has been the placing on record the native names of all the places visited, and the giving of new names to such localities as he considered he had the right to name.

In a forthcoming number the Abbé promises to give a more detailed account of the geography of the country.

JOURNEY IN THE LISSU COUNTRY, WESTERN CHINA.

THE Abbé Desgodins communicates an account of a journey made by M. Dubernard, a brother missionary, with the object of conciliating some savage tribes named Lissu, who had made a raid on the inhabitants of Tse-ko, where some of the fathers resided. M. Dubernard left Tse-ko, which is situated on the right bank of the Lang-tsang-kiang, eight days south of Yerkalo, accompanied by five or six people who were acquainted with the Lissu. He had first to strike out to the north-west in order to pass a spur of the mountain-chain separating the Lu-tse-kiang from the Lan-tsan-kiang. On reaching the other side the descent was rapid, and for two hours they traversed a remarkably dense virgin forest, the vegetation of which was very luxuriant and the *detritus* considerable, while the slopes above were clothed with extensive pastures. The second day the summit of the water-parting between the two rivers was reached, this being the boundary between Yunnan Proper and the country of the Lu-tse or Anongs, who are ruled by the lama of Cha-mu-tong, a dependant of Wesi. Père Dubernard was struck with the capabilities of the valleys, and could not help regretting that they were devoted to no better purpose than hunting-grounds for antelopes, bears, musk-goats, and foxes. On the third day a long valley, running north-east and south-west, was reached, and towards the close of the day the travellers were hospitably received at a village called Bardang by the lama of the district, his example being followed by the chiefs of all the villages passed, who brought out presents of food and game. At Mand Sang the chief had orders from the lama to offer his services as interpreter to the party. On the fifth day Guie-si was reached, a large village situated on the Lu-tse-kiang, and whose inhabitants cultivate wheat, maize, millet, and rice. The general direction of the Lu-tse is here south-westerly, and Père Dubernard followed its course to Yu-ra-gan, and thence to Taso, two days further south. The Lyssus received him in a friendly spirit, but refused to release their prisoners without a ransom. They agreed, however, to desist from raids in

his direction for the future. At Taso a lofty chain of mountains to the westward was pointed out to Père Dubernard as dividing the country of the Lu-tse and Lyssus from Bayul or Pagni, a district which the Lyssus often ravage. A lower chain separates the Terong or inhabitants of Bayul from tribes dependent on Ava.

The Lyssus are nominally subject to Chinese rule. But those on the Lan-tsan-kiang (especially those on the left bank) pay tribute, furnish fighting contingents, and are altogether more amenable than those on the Lu-tse-kiang, who only join military expeditions as a rule to gratify their love of plunder, and pay little or no tribute. Their intercourse with Chinese and Tibetans has not changed their savage nature, which still delights in raids on neighbouring tribes. Their method of signifying their intention of making war is by sending a wand with a feather, a piece of burnt wood, and a small fish attached to it. The feather means that they will come with the swiftness of the bird, the burnt wood that they will burn everything in their path, the fish that their enemies will be made food for the fishes. The mandarins, however, make out that the Lyssus have been exterminated, and accordingly only speak of them as Pagni, which is the name applied to a distinct tribe on the confines of Burma. The reason of this is that about 40 or 50 years ago the Lyssus rebelled, and committed great ravages along the Lan-tsan-kiang, so that their name is still held in great dread through Western China. They live on these excursions wholly by rapine, their arms on such occasions being a cross-bow, with poisoned arrows, a long sword, which they use with great skill, and a large oval shield. Although they bear a character for ferocity, Père Dubernard has been assured that those who have found means to ingratiate themselves with these savage tribes, have found them fair and well disposed in their dealings. Part of their time is spent in agriculture and part in hunting, the former employment being resorted to after burning down a large portion of forest for their operations. This practice is much in vogue in India as well. Prisoners taken in war are always made slaves, but there are no attendant hardships to this lot, as slaves are treated as members of a family, being resold only when they displease their masters. Polygamy exists but not polyandry. Gold is very abundant among the Lyssus of the Lu-tse-kiang, small gold balls being the recognized currency, and weighed in Chinese scales. The religion is pure fetishism, evil spirits being supposed to dwell in fountains, rocks, and forests, and being much dreaded.

The Abbé Desgodins promises to communicate to the Paris Society any further news of interest which he may receive from M. Dubernard.

NOTICE.

The Office of THE GEOGRAPHICAL MAGAZINE is at 57 & 59, Ludgate Hill, E.C.

Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

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THE
GEOGRAPHICAL MAGAZINE.

NOVEMBER, 1875.

JAMES GRAHAM GOODENOUGH.

(Second Notice.)

THE loss sustained by the country in the untimely death of Commodore Goodenough will be even more deeply felt as time goes on than it is at the moment; but the details which have now been received from Sydney bring the heavy blow vividly to our minds.

In the last two years, this well-loved officer, whose worth was already known to naval men and to geographers in this country and throughout Europe, had endeared himself to the people of Australia. The 'Pearl,' the frigate on which his broad pennant was hoisted, arrived in Sydney in August 1873; and in the two following years he won the hearts of all with whom he came in contact, and did much useful and earnest work. The Chaplain of the 'Pearl' thus describes Goodenough's aims in exploring the Pacific Islands, and the thoroughness with which he performed his great services in Fiji, to which we have already referred:—

"The Australian station may be divided into two parts—the pleasant part, Australia, New Zealand, Tasmania, where are fine climate, civilization, hospitality, and kindness; and the less pleasant part, the islands. The latter had a special charm for the Commodore. Imbued with the records of early discoveries, admiring Captain Cook as a true pattern of a discoverer, as brave yet prudent, high minded, accurate, truthful, the Commodore seemed to think it a worthy aim to try and supplement the discoveries of his great predecessor. Life to him was a time for work; he always wearied of ease and gaiety and pleasant times when there was work to be done elsewhere. He never tired of work. One work done, he sought for the next to do, never seeming to think rest possible with work undone. He threw all his energies, and they were great, both physical and mental, into the work at Fiji. The result has been now for some time public, but it seems well to know that his thoroughness would take nothing for granted. Personal enquiries and inspection guided him; he went from place to place, from island to island, seeing first one chief, then another; at one time going into the interior to try and hold personal communication with the mountain cannibals; at another visiting some plantations, testing sugar-cane, examining cotton, seeing everything for himself. So passed the months at Fiji, ascertaining the capabilities of the country, the feelings and dispositions of whites and natives, all the time with such a genial bearing, such courtesy and kindness to all,

with such evident power and knowledge, with such entire candour and truthfulness, that all alike, white and coloured, honoured, trusted, loved him. Especially was he dear to the Fijian chiefs, who had implicit trust in the Commodore."

Missionaries throughout the South Seas have borne testimony to the sympathy and support they received from Commodore Goodenough. The cause of temperance in Sydney, and other ports of Australia, was forwarded by his personal example and public support. But he took the deepest and most special interest in measures for protecting and humanizing the natives of the islands of the Pacific. His last public act in New South Wales was the unveiling of the statue of Captain Cook at Randwick; a statue which had been erected to the memory of a brave man who met with a fate similar to that which brought Goodenough's own valuable life to an untimely end. At the opening of an eloquent and masterly address, which he delivered on the occasion, he spoke of Captain Cook's character in the following words:—"That life was an example of diligence, of industry, and of devotion to duty; and the character which became developed is one which shows perseverance, constancy, courage, and generosity." "How truthfully," observes a writer in Sydney who records this speech, "may these words now be applied to the officer whose praise is in every one's mouth."

In April, 1875, Commodore Goodenough had made a short cruise through the New Hebrides, doing much valuable surveying and other geographical work, collecting information, and making his office a real power felt for good throughout that part of the Pacific. Returning to Sydney, he conveyed Sir Arthur Gordon, the New Governor of Fiji, to Levuka. On the 17th of July 1875, Commodore Goodenough sailed from Levuka in the 'Pearl,' with the object of visiting the different islands of the New Hebrides and Santa Cruz groups, of conciliating the natives, and especially of acquiring full information respecting their relations with white men, by personal investigation and enquiry. A similar cruise had been made in 1871, by Commander A. H. Markham, now serving in the Arctic Regions, who visited most of the islands in H.M.S. 'Rosario,' and performed a very difficult service with tact, judgment, and forbearance. Commander Markham's work, *The Cruise of the Rosario*, contains a full and detailed account of the islands which were the scene of Commodore Goodenough's latest services, and it is a source of comfort and satisfaction to know that the Commodore warmly approved of all the

proceedings of his younger brother officer, and old friend and shipmate in the 'Victoria,' to whom he was much attached. The 'Pearl' visited the islands of Ambroym, Mallicolo, St. Bartholomew, Espiritu Santo, and Vanikoro, where Commodore Goodenough and his officers were received in a friendly manner, and perfect confidence was established. On the 2nd of August the 'Pearl' sailed from St. Bartholomew Island and, after touching at Cape Lisburn, and the bay of St. Philip and St. Jago, the scene of the attempted settlement of Quiros, on Espiritu Santo Island, she went on to Mota or Sugar Loaf Island on the 9th, was at Vanikoro on the 11th, and arrived off Carlisle Bay, in Santa Cruz Island, on the 12th of August.*

The Commodore then landed, accompanied by some officers and men, in the hope of conciliating the natives, and opening friendly intercourse with them. The treacherous and blood-thirsty savages assembled on the beach, accepted presents with pretended friendliness, and were willing to barter. The Commodore entered their village, mixed freely with the people, and passed nearly an hour in apparently friendly intercourse. But when preparations were made to embark, a savage fired a poisoned arrow which struck the Commodore in the left side, and, before any arms could be reached, all of which were left in the boat, several flights of arrows were discharged on the party, wounding five men, and the Commodore again slightly, in the head. On returning to the ship, Goodenough resolved to show disapproval of this cowardly act of treachery by burning the houses of the village where the attack was made, but he gave strict orders that no life should be taken. A writer at Sydney truly says that "the nobleness of the late Commodore's character perhaps never so forcibly displayed itself as after the attack upon himself and those who were on shore with him. When it became necessary to impress upon the islanders a sense of their wrong doing, he gave orders that no life was to be sacrificed; that the village alone was to be destroyed." He thus received his death wound while engaged in a noble endeavour to conciliate and humanize a savage and treacherous people. The Commodore dictated the following despatch, reporting his proceedings, on August 13th, the day after he received the fatal wound, and signed it, without alteration, on the day before his death.

"Her Majesty's Ship 'Pearl,' at Sea,
"Lat. 25° 2' S., Long. 159° 7' E.
"August 19th, 1875.

"SIR,—I have the honour to report, for the information of the Lords Commissioners of the Admiralty, my proceedings since the date of my last general letter, dated the 31st of July, 1875.

"I left St. Bartholomew Island on the 2nd of August, and proceeded northward, calling at Cape Lisburn and St. Philip and St. Jago Bay, in Espiritu Santo, on the 3rd and 4th, Mota on the 9th, and Vanikoro on the 11th, and arrived off Carlisle Bay, in Santa Cruz Island, on the 12th instant.

"I wished particularly to communicate with Carlisle Bay, where the 'Sandfly' was attacked in September last year, in order, if possible, to open a friendly intercourse with the natives. I therefore steamed off the entrance of the bay in the 'Pearl,' and finding the harbour too small for the ship to enter I took two cutters and a whale-boat into a village fronting the entrance. I landed with precaution, accompanied by several officers, made some presents, and bartered with a few things the natives brought down. The natives were in good numbers. Several of them

had put off from different parts of the beach in canoes, some of which met the boats on their way to the shore. After remaining on shore three-quarters of an hour, and feeling satisfied with the advances which had been made, I ordered the party to prepare to leave for the ship. Every person was in or close to the boats, except myself, Lieutenant Harrison, R.M.L.I., and my secretary, Mr. Perry, when a man, standing between two huts about 4 yards from me, fired an arrow which struck me on the left side. I turned at once to the boats, which shoved off, receiving at the same time two or three flights of arrows, which struck five of the men, and myself a second time on the head. To stop the attack a few shots from revolvers and rifles were fired, and the flights of arrows ceased, one native having been struck by our fire. I then proceeded on board. My first impulse was not to molest them; but on considering the case, and being satisfied, after inquiry, that no person whatever on our side gave the least provocation, I thought it better to send in four boats and burn the village where the attack had been made. The wounds appeared all slight; but as the arrows may be poisoned, and the cases may terminate fatally, I thought it best to proceed at once southward, more especially as the object of my cruise has been to gain personal information, and I shall now be unable, for some little time, to attend to my duties.

"I have, &c.
" (Signed) JAMES G. GOODENOUGH,
"Captain and Commodore
"2nd Class, Commanding Australian Station."

"P.S.—The Commodore died on the 20th of August. I have thought it right I should state on this letter that it was dictated to me on the 13th of August, seen by the Commodore in its present state on the 14th of August, and signed by him as it was on the 19th of August—the day before he died. He wished to sign it without any alteration being made in the last paragraph as it now stands.

" (Signed) W. WYKEHAM PERRY, Secretary.
"21st of August, 1875."

The 'Pearl' at once proceeded to the island of Mota, or Sugar Loaf, to inform the missionary station of the occurrence, and on August 14th shaped a course southward for Brisbane, by the advice of Dr. Messer, the Staff-Surgeon, for the better recovery of the wounded. In the cases of the Commodore, and of two young ordinary seamen, aged 18, named Frederick Smale and Edward Rayner, the poisoned wounds proved fatal. As Goodenough lay in his cabin, and the last sad hours were passing, no murmur was heard to pass the lips of him whose loss was to cause such grief to others. The only regret he expressed, when he knew that his end was approaching, was that he had not strength enough to praise God sufficiently for all his mercies. He apologized to his officers for giving them so much trouble in watching beside his dying bed. He remained conscious to the end, giving to his officers his last fond messages to his bereaved widow and children, in a calm clear voice.

The Rev. James Payton, Chaplain of H. M. S. 'Pearl,' has written the following account of the last days of his beloved chief:—

"On Wednesday, the 18th of August, symptoms of tetanus appeared, and, in all human probability the Commodore must die. He seemed to grasp this fact in all its fulness, at once settling all earthly matters, in which he was thoughtful of every one dependent on him, and attended to the minutest detail of the command he was then called on to give up; then he fixed his thoughts on God. Without one earthly regret, with a perfect trust in the infinite love of God, with thankfulness for all the mercies he had received in his life, he resigned himself to the will of God. Till Friday evening he lingered among us, who, much as we always liked and respected him, in those few hours learned that we only then were apprehending his true greatness. On Thursday afternoon, thinking

* A good map of these islands will be found facing p. 213 of vol. xlii. of the *Journal of the Royal Geographical Society*; and also facing p. 304 of *The Cruise of the Rosario*.

that the end was near, he had all his officers summoned to his bedside, where in lovely and loving words, he spoke of his trust in the infinite love of God and the readiness he felt to go. He had a word for each, a word of love, as at his request each kissed him and said good-bye. He then caused himself to be carried on to the quarter-deck and placed on a bed there, the ship's company being assembled to hear his last words to them. He earnestly desired that no vengeance should be taken on the natives of Santa Cruz. In these last words to the men he spoke to this effect:—"We cannot tell their reason; perhaps they have been injured by white people, but we cannot communicate with them, not knowing their language; perhaps some day—it may be 20 or 30 years hence—some good missionary, some Christian man, may go among them and find out why they did this." His heart was full of God's love to himself, and out of its abundance the mouth spoke. He spoke of this love, and exhorted all to love God, telling them how he had loved them all, even when having to punish them, seeing good in them to love. Many such words were spoken before he said good-bye, blessing them all in the name of God. A calm sleep followed after this exertion, and on waking his mouth still spoke the same things. He said that as a proof of God's love to him, instead of some dark picture of his past life rising up to trouble him at the last, God would only let his mind dwell on the words 'In whom is no variableness, neither shadow of turning;' he said God had opened, as it were, this little window in Heaven. He retained his consciousness to the last, his face even lighting up with a glorious smile when reminded of his 'little window.' It would be impossible, did one dare further to write publicly of so sacred a scene, to speak of his many loving words to all near to, of all away from him. Unselfish and noble, he even regretted that he was so long in dying, as it gave such trouble to those attending him. One of his last utterances was, 'I have no breath left to praise God for all his mercies.' He died quietly, at 5.30 P.M., on Friday, the 20th of August."

The two young seamen, Smale and Rayner, died, one on the same day as the Commodore, the other on the following day. The 'Pearl' arrived at Sydney on the 23rd, and the public funeral took place on Tuesday afternoon, the 24th, in the cemetery of St. Leonard's, at the North Shore.

The whole community of Sydney heard the sad news with feelings of sorrow and profound regret. Thousands of people assembled to pay their last mark of respect. At 2 P.M. the first minute-gun was heard from the 'Pearl,' and the procession started. It consisted of the seamen and marines of the 'Pearl' and 'Sappho,' followed by a gun-carriage bearing the coffin of the Commodore, and another with those of the two young seamen. Immediately following were Goodenough's two children, Leonard and William, accompanied by Commander Hastings of the 'Pearl' and the Hon. Algernon Stanley. Then followed Mrs. Goodenough, in Lady Robinson's carriage, and other carriages containing Sir Hercules Robinson the Governor, the Bishop of Sydney, the Ministers and Colonial Secretary, and the Chief Justice; the officers of the ships in harbour, and many others. The three graves lie side by side, that of the Commodore being in the centre. Goodenough's grave is near that of Captain

Owen Stanley, the eminent surveyor and Arctic explorer, who died in 1850, when in command of H.M.S. 'Rattlesnake.' The service was read by the chaplain of the 'Pearl,' the Rev. James Payton, the benediction was pronounced by the Bishop of Sydney, and three volleys were fired by a company of men from the 'Pearl' and 'Sappho.' Several thousand persons accompanied the procession; for the loss was deeply felt throughout the colony. Some of that feeling has been expressed in various ways; and the following lines show how truly the life that has been taken from us was valued and understood, in the last scene of its labours:—

"Slowly the long procession moves, with solemn muffled sound,
Ere one of England's noblest men is laid in New World ground.
Ye bear him to the sailor's grave with every honouring rite,
Perished he yet more bravely than hero in the fight.
For when the utmost has been done that public grief can show,
Not half expressed the deep respect that in each heart must flow.
Ah, truly by such holy dead our virgin earth is blest,
We pray our sons may worthy be one day by him to rest.
Another martyr added to the heathen's cruel score;
One who, within the sailor's heart, Christ's healing mission bore,
A man of whom, nor yet from whom, ne'er one unloving word
Throughout his pure peace-breathing life by human ears was heard.
Not long he dwelt among us: but noble natures spread
Their influence quickly, and on all their hallowing radiance shed.
Of those who loved him, who can tell the burden of their cross!
And those who knew not still must mourn the country's deep-felt loss.
God of the world, thy ways are strange! Thou takest thus the man
Whose noble life would seem the most to help in Thy great plan
Of good for all Thine erring children—one whose very face
Spoke of strong Godward aim, with calm soul-winning grace—
A chief who held as holy charge all those within his power,
Who judged them souls—not mere machines—with the immortal dower
Of choice 'twixt good and ill, and led straight onward for the right,
Sparing not self, so he might guide by pure example's light."

THE ARCTIC EXPEDITION.

III.

LATEST NEWS AND FUTURE PROCEEDINGS.

(Continued from p. 298 of our last number.)

AFTER passing down the Waigat on the 17th of July, the Arctic Expedition reached Upernivik on the 21st, and, having shipped Hans and his family, proceeded on the voyage. The news respecting the weather, received from Mr. Krarup Smith and other Danish officials, had been encouraging. The last winter was very much colder in South Greenland than in the north, owing to strong westerly winds from America. In North Greenland the winter was unusually mild, and much ice kept drifting south until March. At Godhavn the mean temperature of the winter months was from 5° to 13° Fahrenheit higher than the average. But the spring was more severe than usual. The inferences were that an unusually large quantity of ice had been drifted out of Baffin's Bay, but that there was a check, owing to westerly winds, in the spring; consequently that the season of 1875 was favourable for navigation late in the summer, but not in the early part, and that it would have been a mistake for the expedition to have reached Melville Bay earlier than the latter half of July. We now know that these inferences, from the reports received at Godhavn, were well founded.

In facing the dangers generally encountered in Melville Bay, officers and men were fully prepared for the worst, and all the necessary arrangements had been made. In the event of a sudden nip destroying the vessel, provisions were placed in readiness on the upper deck, and haversacks were served out to every officer and man, with the names painted on them, each containing two blanket wrappers, one pair of boot hose, stockings, mitts, and drawers, mocassins, one jersey, one comforter, a Welsh wig, a towel, comb, and piece of soap. All officers and men were also told off to the different boats in the event of being forced to abandon the ship. The plans for the shape of a dock cut in the ice, and of the pieces to be sawn, were also drawn to scale, and officers and men were appointed to provide stores, to work at the different ice saws, and to prepare and ignite blasting charges, each with his special duty.

The expedition sailed from Upernivik at 8 A.M. on the 22nd of July, but soon a dense fog made it necessary to take shelter in a small bay near Kingitok Island, the northernmost of the settlements in Danish Greenland. Here the 'Alert' ran on a rock, and remained immovable for five hours, getting off without any difficulty at high water. The fog having cleared up, the expedition shaped a course due west (true), for it had been determined, instead of creeping round the land-ice of Melville Bay, to make a dash through the middle pack. At 1 A.M. on Saturday, the 24th of July, the 'Alert' and 'Discovery' made the pack edge, and at once pushed into the ice, which was very loose, not more than 12 inches thick, and with lanes of water in all directions. Evidently all the ice formed during the winter had been drifted south by the northerly winds, and this new ice had been formed in the spring. It was an unprecedented open season.

In the afternoon of the 24th the first bear was sighted, and Commander Markham, with Lieutenant May and Dr. Moss, at once went in chase in the dingey, followed by Lieutenants Parr and Giffard and Captain Feilden; but bruin was too wary on that occasion, and the party returned, Lieutenant May having fallen through the ice. He was, however, none the worse for his cold bath.

At 11 A.M. on Sunday the 25th of July the 'Alert' and 'Discovery' got clear of the pack and entered the "North Water" of Baffin's Bay. The expedition had only been 34 hours in the ice, and 70 hours in going to Upernivik to Cape York. Former expeditions were 38 and 42 days struggling through the ice in Melville Bay, before they sighted Cape York. The 'Discovery' then went inshore to communicate with the natives, and endeavour to engage a brother-in-law of Hans as second dog-driver, while the 'Alert,' passing the Crimson Cliffs of Beverley and Cape Dudley Digges, proceeded to the easternmost of the Cary Islands,* which she reached at midnight of July 26th.

Two large depôts of 3600 rations each, being one month's provisions for 120 men, had been prepared, called A. and B., and were stowed on the upper decks of the 'Alert' and 'Discovery' respectively,

* In paragraph 4 of the Admiralty Instructions there is a passage to the effect that it may be worthy of consideration whether to leave a depôt and boat at the Cary Islands. This does not occur in the Report of the Arctic Committee.

ready for landing. Depôt A consists of 28 casks and 101 cases, as follows:—

Sugar	400 lbs.	Preserved potatoes	350 lbs.
Fine salt... ..	32 "	Pickled onions ...	111 "
Boiled beef	3636 "	Piccalilli	111 "
Stearine	395 "	Tea	60 "
Chocolate	230 "	Biscuit	2700 "
Pepper	10 "	Rum	55 galls.

One tin of beef weighs $7\frac{3}{8}$ lbs. including tare. Depôt B is the same as A in all respects.

Depôt A, and the whale-boat supplied by the 'Valorous,' were landed on the easternmost Cary Island, with the record and letters which have been brought home by the 'Pandora,' during the night of July the 26th. The 'Discovery' here rejoined the 'Alert.' There was an extraordinary absence of floe-ice, and the long prevalent northerly winds, which Allen Young found still blowing in August and September, must have carried the old ice out of Smith Sound and Baffin's Bay in unusually large quantities, and probably caused an extraordinarily open season. The temperatures seemed to corroborate this view. On the 26th, that of the surface-water rose to 40° Fahrenheit, at 4 P.M., and was still 40° at 6 and 8 P.M. This was an indication that there was no more ice in the vicinity of the ships. At 6 A.M. on Tuesday the 27th of July, the expedition left the Cary Islands, and proceeded to Smith Sound, with the brightest prospect of an open sea, and of being able to obtain a high northern latitude. They had six weeks of navigable season before them.

A record was to be left at Sutherland Island, and, if the entrance was fairly clear of ice, also at Littleton Island on the east side. Sutherland Island is the position most easily reached by a vessel coming from the south, and Littleton Island from the north, as there is sure to be always much water in the narrow part of the channel. The ships were then to cross to the west shore of Smith Sound, and work their way to the north on that side. If there was much ice north of the Cary Islands, the principal cairn, with records, would be on Gale Point, south of Cape Isabella. The latest news will probably be found here, for if, as is likely, the 'Discovery' winters on the west side of the channel, it will be easier for her to communicate with Gale Point or Cape Isabella than with Littleton Island, owing to the difficulty in crossing Smith Sound. A boat was to be landed at ———. Depôt B was to be landed probably at ——— on the western side with a boat, and travelling depôts of 240 rations (20 days for 12 men) at three specified points south of the 'Discovery's' winter quarters, namely at ———, and ———. Cairns were to be built near the depôts, with notices buried 20 feet magnetic north of them.

It was hoped that suitable winter quarters would be found for the 'Discovery' on the north shore of Lady Franklin Strait, in latitude 82° N., or a short distance further north. As soon as she was snugly established, a depôt of 10,000 rations was to be formed on shore, together with a supply of coals. Captain Stephenson would then at once throw out hunting parties, both to the shore and on the ice, to collect food for the dogs.

The 'Alert,' taking two officers and men for two sledge parties from the 'Discovery,' was then to have pressed onwards alone to the north. Depôts and

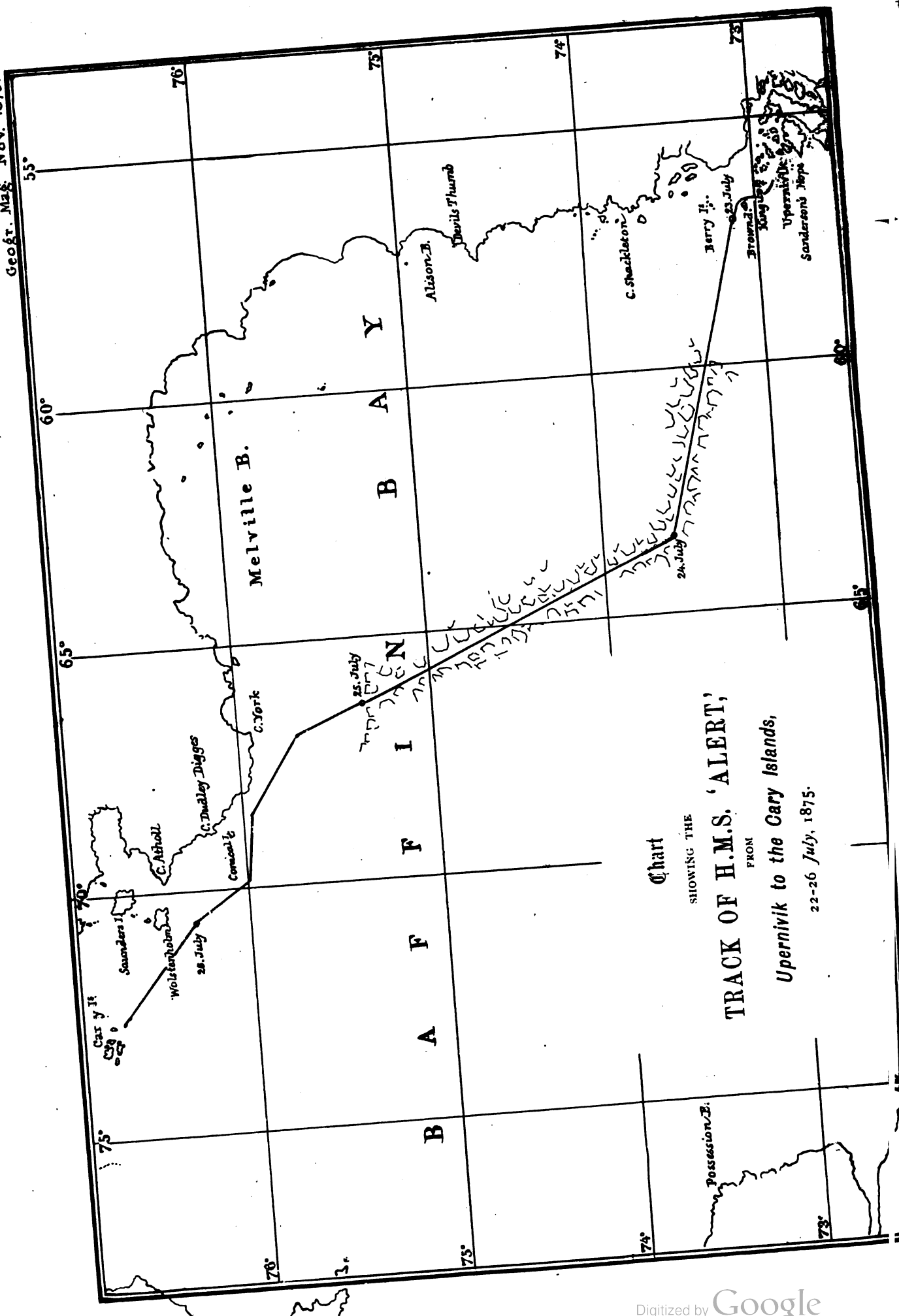


Chart
 SHOWING THE
TRACK OF H.M.S. 'ALERT,'
 FROM
Uperrivik to the Cary Islands,
 22-26 July, 1875.

cairns would be landed, at intervals of about 60 miles, consisting of 480 rations each, or 40 days' provisions for 12 men. With these heavy undermanned ships, the surest way of reaching the Pole, in the opinion of Captain Nares, is not to risk failure by pushing forward away from the land. If the 'Alert' can winter even in 84°, and there is land ahead, there is the certainty of attaining a very high northern latitude by sledge-travelling, and of exploring the neighbouring coasts so as to be prepared to advance the ship along known shores during the following season. For Captain Nares considers a second season preferable to pushing off away from the land, and thereby risking a winter in the drifting pack, whence all chance of exploring is at an end. Consequently if the land north of Cape Union trends westward, with a navigable sea, but no land in sight to the northward, Captain Nares has made up his mind to remain by the shore for the first winter. Then, with increased knowledge of the trend of the land, the direction of the prevailing wind, and the currents, and having ensured certain communication with the 'Discovery,' the 'Alert' can push boldly northward in the summer of 1876. If, however, there is continuous land to the north, the 'Alert' will be taken this summer to as high a northern latitude as is possible.

In preparing to face the sufferings and hardships of an Arctic winter, there will be urgent necessity for considering the question of heating and ventilating with great care. For the ships have not been fitted with any warming apparatus, as was the case in previous Arctic expeditions. There are the galley fire and the ordinary service stoves. The stoves are of three sizes, large, medium, and small; the medium stoves having a lifting top, which supplies a hot plate for warming water. Round the funnel of the galley there is a reservoir for receiving ice and snow for water, which is drawn off through a tap below. There will be small stoves for the fore peak and sick bay: a medium stove in the fore part of the lower deck; two large stoves in the after part of the lower deck; a large and a medium stove in the ward-room, and a medium stove in the captain's cabin, all with copper piping passing along the beams, but contributing little or nothing to the heating of the air below them. There is also a small portable drying stove. The calculation was that 1½ cwt. of coal would be used each day, or 25 tons a year, for cooking and warming; 80 lbs. were allowed for the galley; 14 lbs. for the large stoves. But this is altogether insufficient. The galley fire requires 100 lbs. at the very least, the large stoves 28 lbs., and the mediums 15 lbs. during the summer. In winter this allowance must be largely increased. The stoves alone will prove inadequate either for the due warming or the wholesome ventilation of the ships; and the officers will be thrown on their own resources to devise some improvement. Mr. White has already suggested a plan which will probably be tried. He would have a funnel open at the top to the outer air, passing through the upper deck and the lower deck, and then up through the lower deck again so as to form a syphon. It will then pass through a large stove so as to heat the fresh outer air, and out a few inches above the deck, where there would be a valve to regulate the outflow of the pure

hot air, which would then rise, and diffuse warmth while expelling the bad vapours. Sir George Back also furnished a valuable suggestion to Commander Markham and Lieutenant Beaumont. In the 'Terror' he secured healthy ventilation by the use of a wind-sail, bell shaped at the mouth, brought down to within a short distance of the deck. It is very important that these or some other equally good plan should be adopted, for success entirely depends on the preservation of health and good spirits during winter quarters.

There will be no want either of occupation or amusement in the long darkness of at least 120 days, that the explorers must encounter. The observatory for magnetic observations has been taken out in pieces from England, with no iron in any part, and a copper stove has been supplied for it. This wooden edifice will be erected on shore, if the ship succeeds in finding winter quarters in a harbour, and there will be another observatory for the astronomical observations. Thus the scientific staff will be steadily at work through the winter, while the instruction and amusement of officers and men will be fully provided for. There will be schools for teaching navigation and other branches of knowledge. A large collection of excellent magic-lantern slides furnishes the means of illustrating lectures on astronomy, as well as amusing tales and anecdotes. The ships are badly supplied with Arctic works, but in other respects the forethought of friends and well wishers has furnished an excellent and judiciously selected library, which has been catalogued and classified. The expedition is rich in musical talent, and each ship has a piano and a harmonium. Lieut. Aldrich is an accomplished pianist, Lieutenants May and Egerton play the banjo, and there is a talented drum and fife band on the lower deck, besides any amount of vocal music fore and aft. Commander Markham, with Mr. Egerton as a confederate, will give entertainments of magic and legerdemain, and can perform all conjuring tricks from the magic bottle to dark *séances* and clairvoyance. The histrionic talent is also in strong force on board both ships: many presents of dresses and properties were received, including one from Mr. Irving, and a magnificent proscenium has been painted for the 'Alert.' There will also be periodical literature and newspapers, besides printed play bills and notices; the printing department being ably conducted by Lieutenant Giffard and Robert Symons. Nor has due provision for such festive occasions as birthdays and Christmas-tide been forgotten, and numerous plum-puddings and cakes, many pounds of mince-meat, and boxes containing bottles of punch, together with the nine sheep, supply the means to both officers and men for their celebration.

The importance of the duties of making the winter pass quickly and pleasantly away, by amusing as well as employing the minds of all on board, and preventing their caring for the inevitable hardships and sufferings; as well as by strictly enforcing the proper amount of daily exercise and the observance of sanitary regulations, cannot be over-estimated; and every member of the expedition, by cordially and heartily entering into the spirit of the work, will, each in his place, thus secure the maintenance of the general health both of mind and body. It is this alone that can ensure that

elasticity and vigour which, in the spring of 1876, is destined to carry the crosses of St. George far into the unknown north.

As the sun begins to approach the horizon the grand work of the expedition will commence. The object will be to reach the Pole, and, on the return of the supporting sledges, much will be done in exploring nearer the ships. In our number for March 1875, p. 65, we gave some general details respecting the English naval system of Arctic sledge-travelling; but it is important, with a view to a proper understanding of the means by which this great national achievement is to be done, that geographers should be fully acquainted with the exact details of sledge-travelling as arranged for the present expedition.

For each ship there are two 12-man sledges, six 8 and six 5-man sledges, three satellites and 1 ladder-sledge for glacier travelling; of the following dimensions:—

The 12-man sledge has 7 uprights 19 inches apart. It is 14 feet long, 3 feet 5 inches wide, 1 foot 2 inches high, and weighs 182 lbs. 8 oz. complete with drag-ropes and bottom.

The 8-man sledge has 6 uprights 18 inches apart. It is 11 feet long, 3 feet 2 inches wide, 11 inches high, and weighs 122 lbs. 14 oz.

The 5-man sledge has 4 uprights 15 inches apart. Its length is 8 feet, width 2 feet 8 inches, height 8 inches and weight 5 lbs.

The tents are of light close unbleached duck. That for the 12-man sledge is 14 feet long at the bottom, and 10 at the top, 7 feet wide on the ground, 7 feet high, and weighs 41 lbs. The tent-ropes are 6 fathoms long, of 1½ inch, and the tent-poles of ash 10½ feet long.

The 8-man tents are 9 feet 4 inches long at the bottom and 8 at the top, 7 feet wide and high, and weigh 31 lbs. 14 oz. The tent-ropes are 6 fathoms long of 1¼, and tent poles (weighing 5¼ lbs.) are 8 feet 6 inches long. The 5-man tent is 7 feet long by 6 feet 6 inches wide and high, weight 22 lbs., the tent-ropes 5 fathoms of ¾ inch, and length of tent-poles 7 feet 10 inches.

The tent furniture (consisting of coverlet, lower robe, floor cloth, sail, trough, and bottom) weighs 61 lbs. 3 oz. for an 8-man tent, 52 lbs. 10 oz. for a 5-man, and 96 lbs. 6 oz. for a 12-man tent. The sleeping-bag, 6 feet 8 inches long, weighs 8 lbs. 2 oz.

The clothing for each man, on starting, consists of:—

1 flannel or wove woollen frock	1 drag belt of light horse girth (5 ft. long by 3 in.)
1 thick guernsey frock	1 Welsh wig (1 spare)
1 duffle frock (1 spare)	1 cap, veil, and face cover
1 pair of duffle trousers	1 comforter (1 spare)
1 duck jumper and trousers	1 tin water-bottle to hold ¼ of a pint
1 pair of worsted stockings (1 spare)	1 gutta-percha cup
1 pair of thick wove woollen drawers (1 spare)	1 pair of coloured spectacles
1 pair of blanket feet-wrappers (2 spare)	1 pair of canvas boots (2 spare)
1 pair of wadmill-boot hose (1 spare)	Towel and soap
1 pair of smoked moose-skin mocassins (3 spare)	The weight of the knapsack (17 inches wide, 12 high, and 6 deep, weighing 9 oz.), including spare clothing, is 12 lbs.
1 pair of mitts (2 spare)	

* For a description of the sledge flags, of the different officers, mottoes, &c., see the *Geographical Magazine* for June, 1875, pp. 172-173.

The daily allowance of food to each man, while travelling, will be 1 lb. of pemmican, ¼ lb. of bacon, 14 oz. of biscuit, 2 oz. of preserved potatoes, 1½ oz. of chocolate, ½ oz. of tea and sugar, 1 oz. (½ a gill) of concentrated rum, 55 above proof; besides 1¼ oz. of salt, ¼ oz. of pepper, 1 of onion powder, and 3 of tobacco a week. The weight of one ration is 2 lbs. 11 oz., of 20 rations 59 lbs. 2 oz.; and of 160 rations, or 20 days' provisions for 8 men, 473 lbs.

For depôts the pemmican cases are 20 inches long by 10½ by 7½, weighing 56 lbs. full, and 8 lbs. empty. The depôt tins of bacon weigh 52 lbs., and are filled up with 8 lbs. of tallow, weight 12 lbs. empty. A depôt of seven days' provisions for 8 men weighs 201 lbs., and can all be stowed in one cask weighing 90 lbs., total weight 292 lbs. There are also waterproof depôt cases of gutta-percha pressed upon coarse duck.

The cooking apparatus consists of a kettle resting on and fitting to the lamp, which is fed by alcohol or cocoa-nut stearine—six pints a day of spirits of wine, or 1 lb. of stearine. The largest sized kettle holds 13 pints, and its lamp of 10 wicks requires 9 oz. of alcohol or 5 oz. of stearine for boiling. The next size holds 9 pints, and also has 10 wicks (6 oz. of alcohol and 3 of stearine to boil). The third size holds 6 pints (4 oz. of alcohol and 2 of stearine) with 7 wicks, and the smallest holds 3 pints, with a lamp of 5 wicks, needing 2 oz. of fuel to boil.

The supply of medicines and surgical appliances for the travelling parties has received the most careful attention from Dr. Colan; and he will give instruction on the subject to each officer commanding a sledge. At first he was only allowed a weight of 8 lbs. for medical stores, which has been extended to 12 lbs.; and the following is the list for each sledge, to be made up in a tin case (20 inches by 5 and 7) and a medicine tin for bottles (7½ inches by 5½) together weighing 4 lbs.

MEDICAL STORES FOR EACH SLEDGE.

	oz. dwt.		oz. dwt. gr.
Salvolatile and aromatic spirits of ammonia (2 phials)...	3 0	3 calico bandages..	3 4 0
Laudanum (2 phials)...	1 4	2 flannel bandages .	6 0 0
Wine of opium (2 phials)	1 0	Lint	6 0 0
Gregory's powder (small tin)	1 0	Oil silk	1 0 0
Dover's powder (12 papers of 10 grains each)	0 2	Sponge	1 0 0
Chalk powder (32 papers of 15 grains each)	1 0	Pins in paper..	0 1 0
Sugar of lead (30 papers of 4 grains each) ...	0 2	Expanding splints (2) and carbolized tow	20 0 0
Turpentine liniment (bottle)	6 0	Fine tow or cotton wool	3 4 0
Carbolic acid (phial)...	1 4	Catheter... ..	0 1 30
Glycerine ointment in oiled silk	6 0	Tourniquet	6 4 0
Simple or white ointment	3 0	Truss with pad ...	8 4 0
Carbolic plaster... ..	1 0	Lancet	0 1 0
Purgative pills (4 dozen in phials)...	0 4	Quill	0 0 10
		Persian gauze ...	0 4 0
		Eye-shades (2) ...	0 4 0
		Small splint	0 1 0
		Scissors... ..	0 1 0
		Flannel ice-goggles in metal case ...	0 7 0
		Tape	0 1 0
		Mustard (in paper) ...	0 4 0
		Total weight of medicines, &c.,	7 11 40
		Weight of cases	4 0 0

The weight of the sundry bag has also been increased from 8 lbs. to 12 lbs. It contains slow match, palm and needles, senit and twine, nettle stuff, nails, tent-brush, chopping-axe, spare hide, 2 spare cross-bars. Then there are pannikins holding 1¼ pint

for each man, large horn-spoon, spirit measures, funnels, and daily rum can.

The sledge, tent and furniture, clothing, cooking gear, sundry and medicine bags, &c., form the constant weights, which do not alter, and it is of the utmost importance to keep them as low as possible. The calculation for the constant weights for the different sledges is as follows:—

CONSTANT WEIGHTS.

	12-man sledge. lbs. oz.	8-man sledge. lbs. oz.	5-man sledge. lbs. oz.	2 men and dogs. lbs. oz.
Tent, complete	41 0	31 4	23 4	23 4
Tent poles	39 4	22 5	22 5	22 5
Sledge, complete	182 8	122 12	56 0	64 0
Bottom	3 12	3 6	1 10	—
Trough	12 0	8 4	5 2	5 5
Sail	11 0	9 1	7 2	—
Floor cloth	16 0	11 4	8 9	8 2
Lower robe	25 0	18 4	14 4	16 0
Coverlet... ..	28 2	21 0	15 8	—
Sleeping-bags	97 8	67 0	40 10	16 4
Knapsacks	144 0	96 0	60 0	24 0
Shovel and pick	12 0	12 0	12 0	10 0
Cooking gear... ..	24 7	20 5	15 0	8 0
Small cooking apparatus	20 5	15 0	—	—
Ammunition... ..	16 0	16 0	8 0	8 0
Gun... ..	7 0	7 0	7 0	7 0
Sundry bag	12 0	12 0	6 0	6 0
Instruments	13 0	13 0	—	—
Medical stores.	12 0	12 0	12 0	12 0
Luncheon bag.	12 0	9 0	5 0	5 0
Saw and 5 snow-knives.	5 0	5 0	5 0	—
Sail gear... ..	5 0	5 0	—	—
Pemmican chopper. ...	3 0	3 0	3 0	—
	<hr/>	<hr/>	<hr/>	<hr/>
	741 14	539 13	327 6	235 4
Weight for each man ...	67 5	77 1	81 13	

To the constant weights must be added that of 40 days' provisions, the largest amount that can be carried on one sledge. Each ration weighs 2 lbs. 11 ozs. For a 12-man sledge there will be 480 rations, weighing 1290 lbs. or 107½ lbs. to each man, which added to 66 lbs. constant weights makes 173½ lbs. for each man to drag, of course getting less every day as the provisions are consumed. For an 8-man sledge there will be 320 rations, weighing 810 lbs., or 100 lbs. for each man, which added to his 77 lbs. constant weights makes 177 lbs. for each to drag. For a 5-man sledge there will be 200 rations, weighing 537½ lbs., or 107 lbs. for each man, or, added to 81¼ lbs. of constant weights, makes 188¼ lbs. for each man to drag. It will, however, be chiefly the 8-man sledges that will make the long journeys, with a load of 40 days' provisions.

The conveyance of a boat, with the long travelling parties, in the event of meeting open water, is a measure of the greatest importance. The sledges for carrying boats have the two end cross-bars fitted with two cleats, one on each side of the boat's keel. These cleats are 7 inches long, and are securely lashed to the cross-bars. Two battens of American elm, each 2 inches wide and half an inch thick, are lashed in a fore-and-aft direction to the top of the cross-bars 3½ inches apart, that is to say 1¾ inch on each side of the central line of bearer. They are sufficiently long to allow of their being secured to all the cross-bars. When the boat is placed on the sledge the keel rests on the cross-bars between the cleats, and is held in an upright position by four cushions of stout canvas, stuffed with cork cuttings, the whole being kept in place by lashings. Two

parts of inch rope are passed through the cork fenders to keep them in shape. The weight of the 20-foot boat on a 14-foot sledge, prepared for travelling with 4 paddles only, is 1006 lbs.; of the 15-foot boat on an 11-foot sledge, 706 lbs.

Great assistance is often derived from the use of a sail on the sledge, which materially eases the labour of dragging. Two tent-poles are lashed together as a yard, with a spare pole as a foot yard. The other two poles are used as sheers, and at their ends a mast-head iron or sheer head is fitted, consisting of two rings united by a piece of iron about 3 inches long, from the centre of which there is a hook on each side for the steadying guys, and a small block for the halyards is seized on to the iron between the rings. A spare cross-bar (with a span seized along its top side, and the bights, with a thimble in each, projecting just beyond the cross-bar) is placed on the trap of the lading, over the midship upright, and lashed down to the bearer. The ends of the sheers are then stepped into the thimbles attached to this cross-bar; and the sail hoisted. On smooth ice, with the wind aft or on the quarter, a sledge will travel under sail at a good pace.

Such are the arrangements which the results of long experience have shown to be best for Arctic travelling. It has been stated that a better system might be introduced by imitating that of the Hudson's Bay Company's traders in North America, but the circumstances are entirely different between the Company's territory and the true Arctic Regions north of the 70th parallel, both as regards the country, the weather, and the men. Sir James Ross and Sir Leopold M'Clintock, the founders of Arctic sledge-travelling, were fully informed respecting the methods of the Hudson's Bay Company's traders, and would have adopted them if they had been suited to the conditions of the Arctic Regions north of 70° N., but they are not. The flat Hudson's Bay sledges were tried in the autumn sledge-travelling of 1850, and were found to be worse than useless; while the snow huts are only necessary during intense cold, when they will be used, as they were by Sir Leopold M'Clintock.

The spring travelling of 1876 will probably commence about the 1st of April, and the main attempt will be made by six sledges and 52 men, an arrangement which will only leave ten in the ship, including officers. This fact proves how short handed the expedition really is. In our number for June 1875, p. 172, we described the flags and other cognizances of the officers commanding sledges, six of which will be seen fluttering in the breeze on some distant ice field, in the early days of next April. The object of all will be to enable one sledge to approach the North Pole, by advancing to the north for 56 days and attaining a distance of 500 miles from the ship.

The grand achievement will be done by a system of depôts and auxiliary sledges. Let us call the sledges A, B, C, D, E and F, five of 8 men, and one of 12 men, the object being to enable A to advance singly to the Pole. All start with 40 days' provisions, F (the 12-man sledge) consequently having 480 rations, and the other five 320 rations. After five days F has 432 rations left, and requires 60 to go home. He fills up the other five sledges (who by that time are down to 288 rations) to 320 rations again, leaves 176 rations at the Depôt I, and returns (assuming they all

started on April 1st) on April 10th. He then comes out again to *Depôt I.*, consuming 120 rations out and home, and leaves 360 rations, making 536 at the *Depôt*. After another five days (10 days in all) *E.*, in like manner, fills up the four other sledges to 320 rations, leaves 128 at *Depôt II.*, and returns to *Depôt I.* with the 32 that are left to him. He there fills up to 320, goes back to *Depôt II.* with 288, leaves 256 there, making 384 in all, and goes home.

Two *depôts*, at distances of five and ten days from the ship, are now stocked with 216 and 384 rations respectively, and four 8-man sledges are loaded with 40-days' provisions each, at a distance of ten marches from the ship.

Sledges *D, C, B,* and *A,* then advance for 5 more days (15 in all), and find themselves with 280 rations. *D* fills up the other three sledges to 320, and keeps enough to take him back to *Depôt II.* (128 rations), leaving 120 rations at *Depôt III.* He takes enough at *Depôt II.* to take him to the ship, and returns home. Three sledges then advance for ten days (25 from the ship), when they have 248 rations left. Sledge *C* fills up the two others to 320 each, leaves 120 at *Depôt IV.*, and goes home, taking 40 at *Depôt III.*, 40 at *Depôt II.*, and 40 at *Depôt I.* *B* and *A* then go on until they are 36 days from the ship, when *A* is filled up to 320 rations, and left to do battle with the unknown obstacles ahead single handed. *B* leaves 80 rations at *Depôt V.*, takes up 48 at *Depôt IV.*, 40 at *Depôt III.*, the same at the other two, and so reaches the ship.

Sledge *A* is now 36 marches from the ship, and filled up to 40 days' provisions. He presses onwards to the North Pole until half are consumed, when he will be 56 marches from home on about May 26th; and, we may hope, at the goal. He returns to *Depôt V.* in 20 days more, when all will be consumed. But he there finds 80 rations left by *B*, which take him to *Depôt IV.*, where he picks up 48, at *Depôt III.* 40, at *Depôt II.* 40, at *Depôt I.* what more he requires, and so returns to the ship after an absence of 112 days. No one, who is without experience of Arctic travelling, can realize the hardships, dangers, and sufferings that these brave men will encounter and overcome. If ever heroes deserved well of their country for upholding her fame, and battling for her interests, assuredly our dear friends, now far away in the unknown region, will take their places among the foremost. Anxiety for them we cannot but feel, but it may be softened by well-founded hope, and by confidence in their prudence and ability.

As the earlier sledges return, they will be able to do much exploring and collecting work, as well as hunting, at shorter distances from the ship; and we may hope that much oxen, reindeer, and birds will be abundant.

Then other officers, including *Dr. Moss* and *Captain Feilden*, will probably lead short sledge parties, and display their flags, while performing very useful work. The dogs will chiefly be used in keeping open communications, with the '*Discovery*'; and the two officers, with their sledge crews, belonging to the '*Discovery*', on board the '*Alert*,' will return to their own ship, to be met half way by parties from the '*Discovery*,' who will advance as far as 84° N., and remain until May 15th at least.

The spring sledging work of the '*Discovery*' will be important, and forms an indispensable portion of the scheme. Her parties will continue the exploration of

the north coast of Greenland, and a *depôt* will be formed beyond *Cape Stanton*. A party will go to *Hall's grave* and examine the stores. Another, with dogs, will communicate with the post at the entrance of *Smith Sound*, and leave despatches and letters there. It is fully expected that some vessel will go to the entrance of *Smith Sound* to communicate and receive news, in the summer of 1876; and a boat will probably be sent down by the '*Discovery*' during the autumn.

The probability of passing a second winter in the ice, and of not being able to complete the work until 1877, has been considered. If no news is obtained of the '*Alert*,' by the '*Discovery*,' in 1876, *Captain Stephenson* is to make a second attempt to communicate in 1877. But if there is still no news, the '*Discovery*' is to land all provisions that can be spared, and to go home in August 1877. For it may then be concluded that the '*Alert*' has advanced nearer to *Cape Bismarck* than to *Robeson Channel*, and may be expected to come out on the east coast of Greenland.* The relief ship, which is to go out in 1877, must, if the '*Alert*' has not been heard of, winter at the entrance of *Smith's Sound*. If the '*Discovery*' cannot get out before August 1877, she is to endeavour to communicate by boat or otherwise with the relief ship, and the officers and crew are to abandon the '*Discovery*' early in 1878, leaving her in a safe position, and as habitable as possible.

But, if all goes well, the '*Alert*' and '*Discovery*' will complete their perilous but glorious mission without accident, and return home in the autumn either of 1876 or 1877.

IV.

THE CRUISE OF THE '*PANDORA*'

THE object of the expedition fitted out by, and at the expense of *Captain Allen Young, R.N.R.*, and *Lieut. Fred. G. J. Lillingston, R.N.*, was to proceed up *Baffin's Bay*, to execute such exploring work as might be possible, and especially to attempt to reach *King William Island*, and make a more thorough search for the relics of the '*Erebus*' and '*Terror*.' They also intended, if possible, to bring home late news of the Arctic Expedition. Although *Captain Allen Young* was fully prepared for a winter, he had no intention of risking detention, unless he succeeded in reaching such a position as would enable him easily to make a thorough examination of *King William Island*, with the snow off the ground.

A suitable vessel for the purpose was found in the '*Pandora*,' a gunboat purchased from the Government, of 430 tons, and engines of 80 nominal horse-power with a lifting screw. She was well-strengthened for Arctic work at *Southampton*, barque-rigged, and, when heavily laden, she has a draught of water of 12 feet. She has 8 boats, including a small steam-launch and 3 complete whale-boats. The '*Pandora*' hoisted the white ensign of the *Royal Yacht Squadron*.

The complement of the '*Pandora*' was 31 officers and men all told. *Captain Allen Young* is well

* Paragraph 17 of the Admiralty Instructions states that final separation is possible owing to a sudden or unforeseen movement of ice resulting in the '*Alert*' being carried down the eastern shores of Greenland. This is not in the Report of the Arctic Committee.

known as the companion of Sir Leopold M'Clintock in the 'Fox,' and one of the most persevering and daring of Arctic travellers. Lieut. Frederick G. J. Lillingston, R.N., is a young officer who is deeply interested in Arctic work; and the third executive English officer was Navigating Sub-Lieutenant George Pirie, R.N., an accomplished young surveyor, who was a volunteer for the Indian Marine Survey Department. Through the intervention of Commodore Jansen, Lieutenant Koolemans Beynan, of the Royal Dutch Navy, an observant and very promising officer, also joined the 'Pandora,' with a view to acquiring experience in ice navigation. He had recently returned from the Sumatra squadron, in which he has been for the last two years, including service with the naval brigade on shore at Achin. The other companions of Captain Allen Young were Mr. McGahan of the *New York Herald*, whose excellent work, describing his visit to Khiva, was reviewed in our number for July, 1874, p. 158; Mr. de Wilde, an artist; Dr. Horner, the surgeon; Messrs. Ball, Porteous, and Jones, the engineers; Mr. Mitchell, the boatswain; Mr. James, the carpenter; and Mr. Henderson, the harpooneer. Mr. Henry Toms, quarter-master in the 'Fox' during her memorable voyage in 1857-59, joined his old shipmate as gunner of the 'Pandora.' Joe, the Eskimo, the faithful companion of Captain Hall, came over from New York to join the 'Pandora'; and there were seventeen seamen, including Thomas Florence, aged 61, who like Mr. Toms had served with Captain Allen Young in the 'Fox.'

The 'Pandora' sailed from Plymouth on the 28th of June, 1875, and, like the Arctic Expedition, encountered head winds and a succession of heavy gales from the west and north-west. On the 9th of July, she lost her jib-boom. The first ice was seen on July 28th, in 58° 50' N., and 45° 30' W., and on the next day a fresh breeze from the S.E. took them into Davis Strait. Passing through the stream of Spitzbergen ice, the 'Pandora' reached open water close in-shore, and arrived at Ivigtot, the port for the cryolite mine in South Greenland, on the 1st of August. Here Allen Young purchased and took on board 20 tons of coal, and, sailing the next day, he discovered an extensive reef on the coast of Greenland in 66° 12' N., and 53° 42' W., about 42 miles south of Holsteinbourg Harbour, where H.M.S. 'Valorous' was then repairing damages. The 'Pandora' arrived at Godhavn, in Disco Island, on the 7th of August, encountered a gale of wind in Disco Bay on the 8th, obtained a good team of dogs at Ujarassuk, took in 40 tons of coal in 12 hours at the Ritenbenk Kulbrud, and proceeded down the Waigat Strait into Baffin's Bay on the 10th of August. On the 13th of August the 'Pandora' arrived at Upernivik, but only stopped an hour to purchase more dogs.

Melville Bay was found to be in a most extraordinary state. Excepting a few bergs, there was not a piece of ice of any description to be seen, in the very place where, at this time of August, the 'Fox' was beset and forced to winter. On the 16th, the 'Pandora' passed Cape York and the Crimson Cliffs of Beverley, of which the artist made some fine sketches, and arrived at the Cary Islands, having had to beat against a strong northerly gale. Captain Allen Young landed the mails for the Arctic Expedition on the north-west island, but he did not find the letters

for home on that occasion, as they had been placed, with Depôt A, on the easternmost island of the group. He found however the remains of the cairn, with the record, erected by Mr. Clements Markham of H.M.S. 'Assistance' on the 21st of August 1851, on the site of an older cairn on which was a piece of wood with the date 1827 cut on it. Captain Young also found two other cairns, built by whalers in 1867 and 1869. The 'Pandora' then ran before a northerly gale for Lancaster Sound, killing two bears and capturing one alive off Cape Horsburg. But on entering the Sound on August 21st, a barrier of ice was found to extend across from Cape Warrender. At last an opening was found along the southern shore, and the 'Pandora' reached Beechey Island on the 25th, where the house built by Captain Pullen in 1854, when in command of the 'North Star,' was found to have been broken into by bears, and the depôt was much injured by them. The stores were surveyed and put in order, the house again made secure, and Mr. de Wilde, the artist, made several sketches and took photographs of the graves of the 'Erebus' and 'Terror's' men. Captain Allen Young weighed the same evening, and shaped his course for Peel Sound.

On the 28th, after some difficulties with fogs and ice-floes, the 'Pandora' entered Peel Sound and passed the furthest point reached by the 'Fox' in 1858. There was not a particle of ice to be seen to the south, and the 'Pandora' steamed along the coast of North Somerset, all on board being full of hope of reaching King William Island without a check. In the evening they were off the part of the coast where Sir James Ross had built a cairn at the furthest point reached during his memorable sledge journey, with M'Clintock, in 1849. Captain Young landed on Sunday, the 29th of August, found the record left by Ross, and deposited one in its place. The 30th was a lovely day, the waters of Peel Sound were as smooth as glass, and the explorers were rapidly approaching Bellot Strait. The land on either side had first been examined and laid down by Allen Young himself, during his arduous journey in the spring of 1859. They reached Roquette Island, only 10 miles north of Bellot Strait, but only to find an impenetrable field of old ice stretching from shore to shore. At this point the 'Pandora' was 150 miles from King William Island, too great a distance for examining its shores in July and August, when the snow is off the ground (which was the aim of the expedition), and getting back to the ship before the navigable season was over, without danger of being detained a second winter. The 'Pandora' was only provisioned for one winter: it, therefore, became necessary to return, with a view to preventing a ruinous waste of power and resources, and to making another attempt next year. This first trial had been gallantly made and was, on the whole, encouraging. The 'Pandora's' voyage was already a most remarkable one.

Captain Young reluctantly turned from the scenes of his former labours and triumphs, as it was obviously impossible to approach nearer to King William Island during the navigable season. With some difficulty the 'Pandora' retraced her steps out of Peel Sound and Barrow Strait, and, before returning home, it was resolved to make another attempt to find the letters of the Arctic Expedition at the Cary Islands. After

beating up from Lancaster Sound, against a northerly gale, the 'Pandora' arrived off the south-east Cary Island on the 11th of September, and sighted the cairn built by the 'Alert.' For some reason, not yet explained, the cairn was placed, not on the north-west island where Mr. Markham's cairn stood, and to which Captain Young had been requested to go, but on this south-east island. Lieutenants Lillingston and Beynon landed, and brought off the letters and records, and the 'Pandora's' head was then turned south. They reached Disco again on the 20th of September, passed Cape Farewell on the 2nd of October, and, running before a fierce north-west gale, the 'Pandora' arrived safely at Spithead on the 16th of October.

The cruise has been extremely interesting and instructive, and has been most useful in giving experience of ice navigation to the young officers; while complete harmony and good feeling prevailed fore and aft. The 'Pandora' has penetrated far down Peel Sound, to a point never before known to have been attained by any vessel, and Captain Allen Young, at considerable risk, has performed a great and valuable public service in bringing home the letters of the Arctic Expedition. We heartily congratulate him, his officers and men, on the results of the voyage, and trust that it may not be the last they will make together in the regions of the north.

A GLANCE AT THE RESULTS OF THE EXPEDITION TO HISSAR.

BY HERR P. LERCH.

(Translated from the "Russische Revue," No. 8 for September 1875).

We have now to add a new item to the manifold and by no means inconsiderable services which the chief of the General Government of Turkistan had already rendered to our geographical knowledge of Central Asia. The expedition to Hissar, composed of three members, Messrs. Vishniefski, Mayef, and Schwartz, completed its task some six weeks ago, and has thus thrown open that territory to scientific geography. It lies, we need hardly say, in the western part of the Upper Basin of the Oxus, and is at present subject to the Amír of Bokhara; but our knowledge of it till now has been most scanty, and in part derived from very ancient notices, for no modern European traveller had ever trodden its soil. Whilst the Iskandar Kúl Expedition, which the Governor-General, in 1870, confided to the guidance of General Abramof, then examined the Upper Basin of the Zarafshán, the present mission to Hissar has made an exploration of the hill-country traversed by the more westerly tributaries of the Oxus on its right bank, and has by astronomical determinations, so to speak, annexed the territory to the domain of our atlases. The accounts which we have till now possessed of this region were founded in part on native reports, and in part (as we have just mentioned) on old historical notices. And we shall now indicate these as a suitable introduction to the precursory report of the Results of the Expedition, which we derive from the *Turkistan Gazette*, No. 28 of the present year.

It is in Chinese sources that we find the earliest notices of the hill-country which extends from the

south of Kesh, the modern Shahr-i-sabz, to the Amú or Oxus at Termedh, over against Balkh. In 629 Hwen Thsang, a Buddhist pilgrim from China, impelled by the desire to visit the cradle-land of his Faith, and to study its sources on the spot, travelled to India by way of Transoxiana; and on that journey went from Samarkand through Kesh, which he calls *Kishwangna*, to Termedh (*Tami*). His description of this district is to be found, more or less abridged, in the Chinese historical and geographical compilations of the time of the Thang dynasty, which reigned from the beginning of the 7th till the beginning of the 10th century; the relations of China to the western countries of Central Asia dating back to the 2nd century B.C.* Even previous to the middle of the first century of the Hijra, the Arabs were already pressing into the Oxus Highlands, but the notices of those campaigns that have come down to us afford hardly the slightest information regarding the politics or ethnology of those regions, and very little indeed as to their topography. We learn only that the territory north of the Amú, and to the westward† of Termedh, was called Sagháníán, and had then a prince of its own. The first to give us more detailed notices of those tracts, as well as of the countries generally on the Oxus and Jaxartes, were the two famous geographers of the 10th century, Istakhri and his friend Ibn Haukál. Nor here should we omit to mention Ibn Dasta, a geographer somewhat earlier than those two, but with whom we have but recently made acquaintance. Sir Henry Rawlinson, it is well known, has quoted from him an extract regarding the course of the Oxus, but has done so with considerable abridgment, as I have been able to satisfy myself by a transcript of the passage made for me last year from the MS. in the British Museum, by the kindness of one of our own scholars, Professor Khwolson. The geographical work of the able Mokaddasi, belonging also to the 10th century, has not yet been published, but we shall not have to wait for it long, as it will form the 3rd volume of the *Bibliotheca Geographorum Arabicorum*, now under publication by Professor de Goeje at Leyden. The first two volumes of this important literary undertaking contain the works of Istakhri and Ibn Haukál. What is imparted on the countries in

* The narrative of Hwen Thsang is to be found in the *Voyages des Pèlerins Bouddhistes* published by the late Stanislas Julien of the French Academy. The notices from historical sources will be found translated into Russian by Father Hyacinth Bitschurin in his *Collection of Notices regarding the Nations of Asia*, &c., vol. iii., pp. 246-247. The same notices of this region are found in the work of Matwanlin, a learned Chinese of the 13th century, and have been published by Abel-Rémusat (*Nouvelles Mélanges Asiat.*, tom. i., pp. 238-239; see also *Magasin Asiatique* i. p. 121, and Klaproth's map therein of Transoxiana from Chinese sources). The recent judicious editor of *Marco Polo*, H. Yule, has followed the examples of Cunningham and Vivien de St. Martin in subjecting the whole of Hwen Thsang's notices on the regions of the Upper Oxus to a new critical examination in a special article, (see *Notes on Hwen Thsang's account of the Principalities of Tokháristán*, in the *J. R. As. Soc. N.S.*, vol. vi. pp. 92-120, with map). Another work of the same writer is sufficiently well known—*Essay on the Geography and History of the Regions on the Upper Waters of the Oxus*, published as an introduction of the new edition of John Wood's narrative of his Journey to the Sources of the Oxus, under aken between 1830-1840. This instructive paper has been translated into Russian by Mme. Olga Fedtchenko, and accompanied by the notes of her late husband, as well as by a new map (see *Russische Revue*, 1873, Bd. iii. pp. 185-187).

† [This should be eastward.]—Y.

which we are now interested by the still earlier Arab geographers El-Ya' ūbi (end of the 9th century), and Ibn Khordābah (middle of the same) is but scanty in comparison with the authorities just noticed, and consists of brief itineraries, the value of which is still further diminished by the uncertainty of the readings of names. The later works of the opulent Arabic geographical literature afford us no new matter whatever.

It was not till the beginning of the 15th century that a European traveller planted his steps on a portion of the hill-country which has been explored by our recent expedition. This was Ruy Gonzales de Clavijo, on his journey as the ambassador of Henry III. of Castille, to the court of Timur. He crossed the Oxus at Termedh, and travelled thence by the famous Iron-gate to Kesh, and on to Samarkand. His itinerary in this tract agrees with the routes which we find in the Persian works on the history of Timur (such as those of Sharifuddin 'Ali of Yezd, Abdurazzák of Samarkand, and Mirkhond). These latter works also afford, regarding the regions to the eastward of the route in question, some geographical data, which have by no means been turned to full account by our geographers. Next we have Sultan Baber, who travelled all about the country in the beginning of the 16th century, and has shed some glimmerings of light on the geography of the Hissár territory in that vivid autobiography of his. From the latter part of the same century we also derive some particulars, which are handed down to us in the very detailed history of a warlike Prince of Transoxiana, Abdulla Khán, which was compiled in Persian under the title of *Sharif-námah-i-Sháhi* by a court historiographer, and the publication of which has been undertaken by a member of our Academy. Abdulla Khán conducted campaigns against Hissár, Kuláb, and Badakhshán. To the middle of the 16th century also belong the Wanderings of a Turk, cast astray in this direction, and whose memoirs were published in a German version so long ago as 1815, by H. F. von Diez in the 2nd vol. of his *Denkwürdigkeiten aus Asien*.^{*} The author, Sidi 'Ali Kátib Rúmi called his book *the Mirror of Countries*. In the 10th and 11th chapters he describes his adventures in the mountains of the upper basins of the Ámú and the Zarafshán: Fedtschenko has made use of the very brief itineraries of this narrative in his notes to Yule's Essay.

But a more recent source of information regarding Hissár, which dates from the middle of last century, has remained hitherto unknown. This is a historical work called *Tárikh-i-Rahim-Khání*, which I first discovered during my stay in Bokhárá, and which treats of the history of Mahommed Rahim, the first Khan of Transoxiana of the Mangít Dynasty, and nephew of Daniel-Bi, the progenitor of the family now reigning in Bokhárá. Rahim Khan fought for the supremacy of his own tribe, with several of the other Usbek tribes, such as the Yúz and the Kúngrát in Hissár, and the Kanagess in Shahr-sabz. The book deserves to be translated into some European language, or anyhow to be published in the Persian original, for it contains numerous ethnographical and geographical data, and describes the occurrences of a period in the history of Transoxiana which is otherwise scarcely known. A

^{*} [Also given in French, in the *Journal Asiatique*, 1st Ser. vol. ix., —].

second copy of the work was brought to St. Petersburg two years ago by Mr. N. P. Pietrovski, formerly agent of our Finance Department in Turkistan. The copy which I brought home for the Asiatic collection of the Imperial Academy of Sciences is unluckily defective at the end. The concluding part of the work consists of the history of Daniel-Bi.

As we have already remarked, the territory of Hissár, explored by our recent expedition, was never before trodden by any European. But Europeans in adjoining countries have collected notices about these uplands, such as Meyendorff, Macartney (in Elphinstone's work on Kábul), Burnes, and Khanikoff. Within the last ten years Hissár and Shahr-sabz were visited by Faiz Bakhsh, a native of India, in the service of the Anglo-Indian Government, during his journeys in Eastern and Western Turkistan. His narrative has been published by H. Yule in the *Journ. R. Geog. Soc. of London*, vol. xlii.^{*}

The following preliminary Report has been published in the *Turkistan Gazette*, under the title of "Short Notices of the Results of the Expedition to Hissár," and I append to it a few notes derived from the older documents which I have mentioned. We shall be better able to judge of the value of these older notices when we shall be in possession of a map based on the researches of the expedition, and of the detailed reports of its members. The present report, we cannot but observe with all its brevity might have been a little more explicit. It affords us no general orographical sketch of the country, and touches only isolated geographical particulars. (Sd.) P. LERCH.

THE expedition explored the western part of the Hissár hill-country in two lines of direction: (1) from Karshi by Khuzár,† Kushlush, Fangi-Khoram, Darband, Sir-ab, and Lailakán to Shir-ábád; and then (2) from Chushka-Khuzár (on the Oxus) by Shirábád, Lailakan, the Valley of Kudukli, and Pitau, to Baisun;‡ These journeys established that the rivers Khuzár-Darya and Shirábád Darya were not the insignificant streams that they had hitherto been taken for. They are the means of life to two very considerable oases, those of Khuzár and of Shirábád. It has also proved Fedtschenko's

^{*} [The learned author has made some slip here. Faiz Bakhsh has not given any narrative of a journey in Hissár.]—Y.

† I cannot make out why our Turki-tan geographers, as well as the anonymous author of the Notices, write *Huzár*. The Oriental authorities, from Ibn Haukál's "Routes and Realms" down to the history of Rahim Khán, write the initial of the name always with the guttural *h* (with the dot above). In the list of the 16 cantons of Kesh (written by the Arabs with double *sh*), detailed by Ibn Haukál and Istakhri, there is a canton (Rusták) of *Khuzár*, and one of the *River Khuzár (Khuzár Rúdh)*. To the first of these are assigned the towns Sunaj, Naukád-Kuraish, and Eskifaghan. The *Khuzár Rúdh* is most certainly what is now called the *Khuzár Darya*. According to the Arab geographers just cited, the Province of Kesh had an extent of four days' journey in length, and as much in breadth. The *Khuzár River* is given as 8 farsakhs distant from the city of Kesh, which according to the Chinese notices (*Ilyacynth*, iii. 247) was built in the beginning of the 7th century. It joined, along with *Táj-Rúdh* and the *Khoshk Rúdh*, another river which flowed by Nasaf (in Persian pronunciation *Nakhshaf*, i. e. Karshi). Between Nasaf and Kesh were three stations; from Nasaf to Naukád-Kuraish the distance was 5 farsakhs, or some 27 miles.

‡ (Of these names we find in Colonel Walker's last 4-sheet map (June 1875); Khozar, Kosh Ulush, Darband (south of Saráb), Saráb, Sherábád; and again Chushka *Ferry* (Guzar?) Sherábád, Baisun.)—Y.

notion that the Khuzar-Darya had its sources in the gorge of Tashkurghan to be erroneous; for the stream from this gorge is the Kizil-su, which discharges into the Kashka River near the village of Karábágh. As regards the Khuzár River, it is formed by the union of the Katta-Uru-Darya with the Kchi-Uru-Darya; the first of which rises among the glaciers of the Sengri-dagh, and the last in those of the mountains of Baisún.

The banks of the Katta Uru-Darya are very thickly populated, and among those hill-people there are folk very well to do, and possessing flocks of 2000 to 3000 sheep, and herds of 500 to 1000 camels. In summer these Uzbeks quit their settlements in the valleys, and betake themselves, with their flocks and herds, to the mountains, where they find, near the margin of the snows, fresh grass for their beasts throughout the summer, so their settlements remain deserted in summer time and show no signs of life again till the beginning of autumn. When winter comes the inhabitants of these places drive their flocks to the Desert* of Karshi where there is comparatively less snow, and where the luxuriance of the *Salsolacææ* affords the animals capital winter fodder.

The expedition first followed the road to Baisún. After passing the wide Chakcha Valley, they beheld in front of them the gorge so famous under the name of the Iron-Gate, known now to the natives as the Buzgola-Khána or Goat house. Till now this spot was known only by name, for the only travellers who have given us any notices of it—and those but vague at best—were a Buddhist missionary of the 7th century (viz. the Chinese Hwen Thsang), and the Spanish envoy to Timur's Court (Ruy Gonzales de Clavijo). Both travellers speak of this gorge as of a very notable natural phenomenon. The first tells us that it was closed by a folding gate cased with iron and hung with bells. As long as the art of war was still in a low stage of development, such a gate might indeed bring a whole army to a stand. But Clavijo, who travelled through this country some 800 years later found the gate no longer to the fore. He only describes the pass as an impregnable position. But the exact site of this pass it has not yet been possible to identify from the descriptions of either the Chinese or the Spaniards.†

* [? "Hunger-Steppe."]

† Hwen Thsang (see *Pelerin's Boudh.* ii. 22-24), after quitting the territory of Samarkand, proceeded, as he relates, in a south-westerly direction 200 *li* (about 100 *verst*s), and then entered a hill-country where the way was rough and led along precipices. No habitations were to be seen, and no water or grass. After he had gone in a south-easterly direction through the hills for 300 *li*, he came to the Iron-Gate. So they call (says he) the defile between two parallel mountains which rise on the right and left, and are of remarkable height. They are divided only by a narrow path, and that cut across by precipices. These mountains form on either hand lofty walls of stone, having the colour of iron. Here has been set up a folding gate lined with iron. To both valves of the gate are attached a multitude of iron bells, and because of these circumstances and of the strength and difficulty of this pass it has received the name which it bears. Thus far Hwen Thsang. He and other Chinese authors place the Iron-Gate on the northern frontier of the old empire of Tukhára, which extended 3000 *li* from east to west, and 1000 *li* from north to south, so that it must have included the Hissár territory.

Yakubi also knows the Iron-Gate under the Persian name of Dar-i áhan which he translates correctly by the Arabic Báb-ul-háhid. With him it is the name of a town, which he places to the north of Balkh and in a line with Kesh and Nakhshaf. Edrisi

Fedtschenko thought (see his notes on Yule's Essay on the Upper Oxus) that the Iron-Gate was not to be sought on the bridle-path of Khozár, but further west on the carriage-road; but the members of the expedition have, on the contrary, established that the Iron-Gate is to be found on that part of the water-shed where the road from Shahr-sabz (the Kalta-minár Road), and that from Karshi (the Khuzár Road) join, not far from Darband.* There is indeed no such thing as a carriage road to Hissar.

At a distance of 3 *tásh*† from Darband, and separated from that place only by the ridge of Darband, is the town of Baisún. The town itself lies in a high valley, always cool, and shut in by mountains all round. After the expedition had crossed the ridge that bounds the cultivated oasis of Baisún on the east, there lay before their eyes the broad valley of the Surkhán, a copious tributary of the Amú-Darya.

Now one of the most important questions which the expedition has solved was this: "Is there any such river as the Surkhán?" On very many maps the Tupalan or Tuplang,‡ is indicated as the most westerly affluent of the Amú-Darya (if we omit the Sherábád River, which does not always reach the Oxus). The river first appeared on Burnes's map,

also (12th century), as rendered by Jaubert, locates at the Iron-Gate "a small, well-peopled town." In Ibn Haukál we find the following itinerary from Nasaf to Termedh, a place which is now called *Teremis* and lies in ruins: Nasaf, Sunej, Dideki, Kandak, the Iron-Gate, Kobáth (*i.e.* a shelter, probably here in the wilderness), Dárank, or Sárék, Hashmjird, and Termedh. If we allow 8 farsakhs to the march, and 8 *verst*s to the farsakh the distance from Nasaf to Termedh will be about 450 *verst*s (300 miles). From Samarkand to Kesh was reckoned two days' journey, and from Kesh to Kandak three marches.

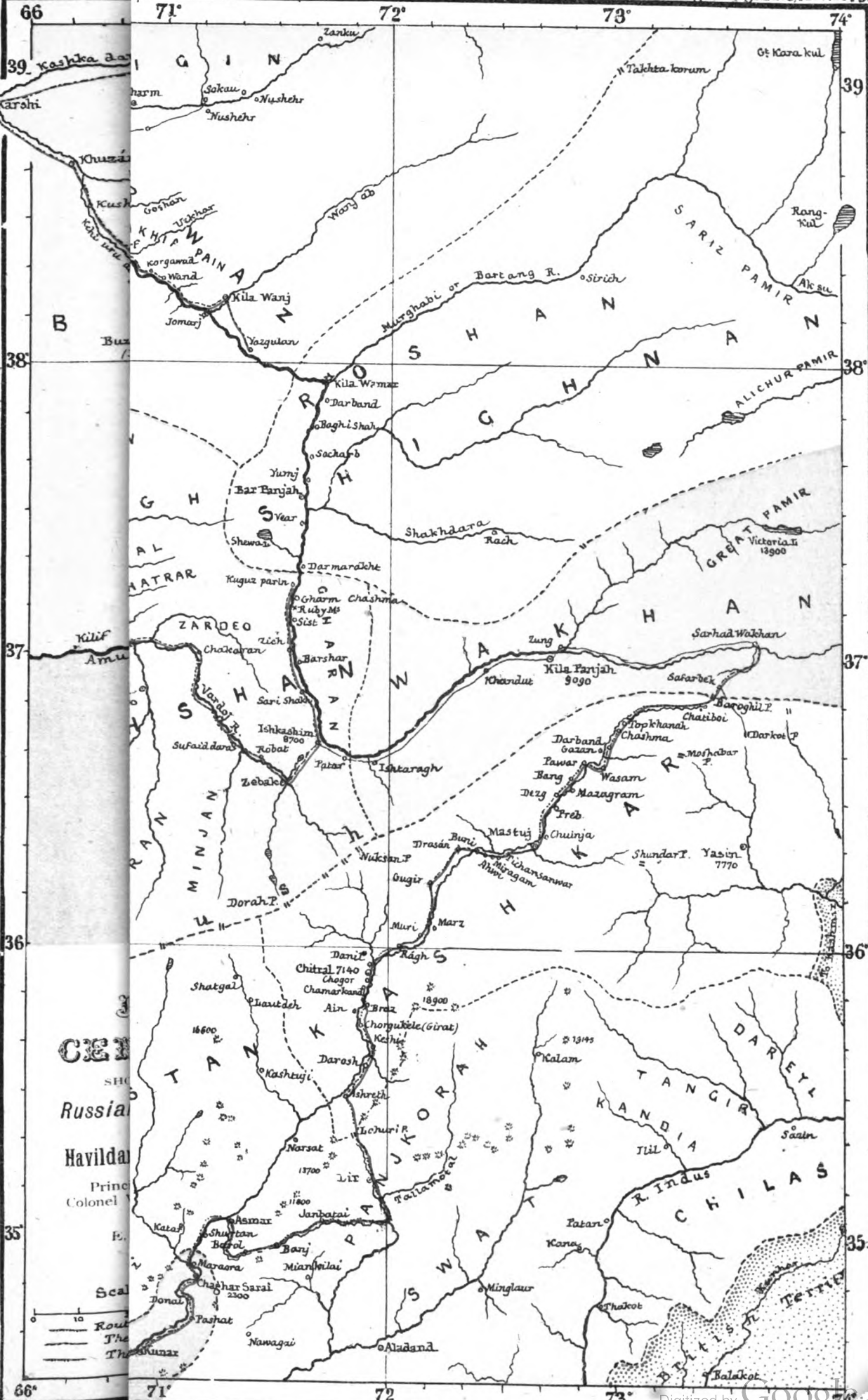
The historians of Timur give the following route between Termedh and Kesh. In A. H. 801, on the 21st of Rajab (30th March, 1398), Timur crossed the Amú with his army, returning from the Indian campaign, and remained the same day and next day in Termedh. On the 23rd he set out, and halted the night at Jahánsháh, on the 24th at Tarki; the 25th he passed through the Iron-Gate (Kohluga), on the 26th was at Jigdalik, the 27th at Kusi-mundak, the 28th at Dúz-Bilchin, the 29th halted at a brook, the 30th entered Kesh.

Clavijo (I make use of the 2nd edition, Madrid 1782, in 4to., a copy now belonging to me which came from the Sobolefski library) left Termedh, or Termit, as he writes, on Friday, the 2nd August, in the afternoon, and halted for the night in a plain near some great houses. On Saturday they passed through thickly peopled localities, and halted in a village. On Sunday they dined in a great building where Timur on this route used to halt, but continued their march and halted on a plain by the side of a river. On Monday they dined at the foot of very lofty mountains, where there was a little palace adorned with glazed tiles. Over these mountains led a pass called the Iron-Gate. Here toll was taken on behalf of Timur for Indian wares. Clavijo heard that there had formerly been an iron door on this pass. The same day they went on, and passed the night in the open on a hill; on the next day, after they had taken their siesta in the vicinity of a nomad camp by a stream, they again halted in the evening on a range of hills, and after a short repose started again at midnight, and so arrived at the great city of Kesh at mass-time on Thursday, the 28th of August.

* We said above that in the 10th century the road from Karshi (*Nasaf*) joined that from Shahr-sabz (*Kesh*), one station distant from the Iron-Gate, at Kandak.

† *Tish* = *Farsakh*.

‡ In the Tárikh-i-Rahim-Kháni this river is called Tufalak or Tupalak. Along with it is named the river (Ab) of Karátágh. Rahim-Khán came with his forces on a Wednesday from Hissár-i-bálá (Upper Hissár) to the river Karátágh, and on Thursday to the Tupalak, where the fortress of Sar-i-Júí was then destroyed. Next day they went to the fortress of Dih-i-nau (new village), which, like Sar-i-júí, lay in the valley of Nihán.



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 Russia
 Havildar
 Prince
 Colonel

thence passed to Khanikoff's, and thence again to all the more recent maps of Hissár. Quite recently too, the idea that the Tupalan was an important river was strengthened by Faiz Bakhsh,* for he included it among the five great streams that joined to form the Oxus. Whilst Fedtschenko, in his notes on Yule's work just referred to, was already disposed to doubt the correctness of this view, holding the Tupalan for an insignificant stream, he also disputed altogether the existence of any such river as the Surkhán.

But the expedition has now established that the Surkhán is really a big river, and one of the most important affluents of the Oxus, whilst the Tupalan is merely a northern tributary of the Surkhán which flows past the towns of Sar-i-júí and Sari-i-Ásia.† Another important affluent of the Oxus is the Káfirnihán, which flows parallel with the Tupalan, and is separated from the latter only by the ridge of the Bába-tágh.

In the valleys of the Surkhán and of the Káfirnihán lie all the towns of the (so-called) province of Hissár, with the exception of these two: Baisún, which, as has been stated, lies with its villages in a highland valley; and Shirábád, which is situated far to the south behind a broad mass of hills. We say *mass* of hills purposely, because the mountains in the west of the Hissár country do not form especial and well-defined ranges, but lofty plateaus rather, traversed by a tangle, as it were, of short ridges of hills.

Just as westward of Hissár the town of Baisún with its villages, thus occupies an isolated highland valley, so to the eastward of Hissár the town of Faizábád occupies a similar valley.

In the northern part of the Hissár territory the expedition visited all the towns of a certain importance, e.g.: Dih-i-nau, Yurchi, Sar-i-júí, Regar, Karatágh, Hissár, Káfirnihán, Doshamba‡ (on the Zihdi-Darya, a tributary of the Káfirnihán). The Káfirnihán River, near the little town of that name, is crossed by a bridge, which every instant threatens to come down by the run. But more difficulty is presented by the passage of the ice-cold Zihdi-Darya near the town of Doshamba. It was only by help of the experience of a native well used to such crossings, that the expedition was able to get over without mishap. They had a similar passage of the Káfirnihán to make in its lower course near Kobádián.

After the expedition had visited the town of Faizábád, which lies on the stream Ilek (a tributary of the Káfirnihán) in a valley shut in on three sides, they proceeded to the valley of the SURKHÁB, the source of which was discovered by Fedtschenko in the Alai Mountains under the equivalent name of the Kizil-sú ("Red-water"). According to the report of competent natives, the Surkháb does really rise in the Alai

Mountains; and the expedition also visited that part of the Surkháb Valley respecting which Fedtschenko collected information, which he has adopted into his map of the Upper Amú and Khokand, information which proves to be very just and accurate indeed. After the expedition had passed the night in the settlement at Norak, they proceeded up the river through a wild and narrow gorge, in which the path had to be followed over dangerous and slippery precipices, and crossed the Surkháb by the famous bridge of PUL-I-SANGÍN (the Stone Bridge). Here the Surkháb is hemmed between lofty and precipitous cliffs, which afford hardly 30 paces interval for its flow, and rushes down into the narrow gorge with a frightful roar. The bridge itself is only 10 paces in length, and is abutted on two projecting rocks.

We must remark by the way that the name Surkháb is entirely unknown in the Hissár country. The river is here known to the natives as the WAKHSH, but further to the north it does bear the name of *Surkháb*.*

* In the *Tarikh-i-Rahim-Khāni* the river is known only by this last name. Between it and the Amú lies, according to this authority, the fortress of Kurhán Tapa, which must be therefore where the Wakhsh comes near to the main stream of the Oxus. In the geographical authorities of the tenth century the Wakhsh is called only Wakhsh-áb. Sir Henry Rawlinson in his annual address to the Royal Geographical Society of London in 1872 (see the *Journal*, vol. xlii. p. cxcix), gave an extract from Ibn Dasta's description of the Oxus, which is also given by the late M. Fedtschenko (too early lost to us) in his notes of the translation of H. Yule's essay. As the original of this passage of Ibn Dasta is now lying before me, it seems to me by no means superfluous to transcribe what he says regarding the Upper Basin of the Jaihún (as the Arab geographers call the Oxus). Ibn Dasta begins thus:—

"The *Jaihún* comes from the East, out of the Land of Tibet, and flows through the Land of Wakhán. In that region it is called Wakh-áb. It then flows into the country which lies above Balkh, and to the east of that city. It next takes a course from the south towards the north till it reaches Termedh; thence the author has described the Delta of the Jaihún he proceeds: it passes to Semm, then to Amol, and then to Khwarizm." After

"And a variety of rivers flow into the Jaihún. Among them is a great river which is called Wakhsh-áb, and comes out of the region above the country of the Kharluh Turks. It flows then into the Land of Fámír, then into the Land of Rást, then into the Land of Komedh (Vallis Comediarum of the ancients); after that it flows among the mountains which lie between the territory of Wáshjird and that Canton (Rusták) of the Land of Khotl which is called Temliát. In this tract (*i.e.* where the river flows among mountains), there is a bridge which is known by the name of 'The Stone Bridge' (it has the same name in Istakhri and Ibn Haukál; and in Timur's history it is called Pulisangín (Persian) and Tásh-Kopri (Turki), both meaning the same). Over this bridge you pass from Wáshjird to Khotl; to the right of the river's course is the Land of Khotl, and to the left is the Land of Wáshjird. After this the river flows on to the extremity of Khotl; and pours itself into the Jaihún at the place called Mileh, above Termedh. In the Land of Khotl, which lies between those two rivers, is the mountain range which is washed on the right by the River Wakh-áb, and on the left by the River Wakhsh-áb; to the right of the Wakháb is the Canton of Upper Tokháristán known by the name of Bargín.*

"Among those (rivers falling into the Jaihún) is also the river which Rámíd . . . (so Rawlinson reads in the B. Museum MS.; the reading seems to be Sámil or Sámíd). This comes out of the land of Rást (again in the MS. Rásb) which is between the commencement of the Wáshjird territory and Sagháníán, and then flows into the territory of Sagháníán. Several rivers flow into this one which come from the mountains of Botm and of Senam, Nihám and Kháwar: they are called the Kam-rúdh, the Nihám-rúdh, and the Kháwar-rúdh. And the river Rámíd flows to the extremity

* [All this will be quite intelligible if you understand that the speaker is looking *outward* and *up* the rivers; so that his right and left indicate just the reverse direction to what we should call the right and left banks.]—Y.

* *Journal of the Royal Geographical Society*, 1872, vol. xlii. p. 465.

† [Surely the simple explanation is that the informants of both Fedtschenko and Faiz Bakhsh applied the name Tupalan to the whole river. The precision of river names, with a few exceptions, like that of names of mountain-chains, comes only of books and geographers.]—Y.

‡ [Doshamba = "Monday," and in the same territory Sidi 'Ali mentions a town of *Chihár-Shamba* = "Wednesday." Mr. Shaw's book on High Tartary enables us to explain this nomenclature; the weekly markets are held in the villages (so-called) on those days.]—Y.

The extreme eastern limits of the expedition were the valleys of Baljuwán and Kuláb (not Guláb as Fedtschenko writes it). Baljuwán lies in a narrow winding valley, on the bank of a small but rapid hill-stream, which is called by the inhabitants the Surkháb. Somewhat further to the south this stream is joined by the Kuláb Darya, and the two united fall into the Wakhsh.* The valley of Kuláb is materially wider than that of Baljuwán. Though narrow and almost a gorge in its upper portion, it widens suddenly out to the south-west, and passes into the marshy, reedy, tigery flats of the Lower Wakhsh.

The expedition at first intended to advance to the point of confluence of the Wakhsh and Panj, in order to fix it astronomically. With this view they proceeded from Kuláb to the fortified town of Kurghán-tuba upon the Wakhsh; but here at last the members of

of the territory of Sagháníán. and there joins the Jaihún above Termedh. The hill-country between the river Rámíd and the river Wakhsh-áb is called Kowádián, and belongs to the government of Khotl. To the right of the Rámíd, in the east of Sagháníán, and to the left of Washájríd (same apparently as Washjird) there flow into the Jaihún also rivers which come from the south out of Upper Tokharistán.* They are called . . . (here follow names of very uncertain reading which Rawlinson reads Fargham, Vartan, and Jilán). These are the rivers which discharge into the Jaihún. Above the land of Khotland on the river called Wakh-áb, which comes out of the land of Tibet and forms the beginning of the Jaihún, gold is found in grains bigger than pins' heads."

The last remark of Ibn Dasta brings me to the conjecture that the Khiva people who told Peter the Great stories about the golden sands in the Upper Oxus region might have got the report from reading some ancient geography book.

As regards Ibn Dasta's notices of the Oxus sources they are no doubt of the highest importance; but I think Sir H. Rawlinson, in placing them so much higher than the notices of the region in question given by the other geographer of the 10th century, does injustice to the latter. In 1872 Professor de Goeje's edition of Ibn Haukál (Leyden 1873) had not yet appeared. It seems to me that this work and Ibn Dasta's, in relation to the Oxus, are admirably complimentary, the one to the other. For in regard to the Wakh-áb, Ibn Dasta is very brief and does not mention its first affluents; whilst Ibn Haukál also affords a variety of precious details on the itineraries of the Upper Oxus region. And I agree with the late Mr. Fedtschenko when he opposes the view of Sir H. Rawlinson that the Wakhsháb of Ibn Dasta is not the Surkháb. His Rámíd seems to be the modern Kafirmihán. Mokaddasi, as I learn from a copy of the Codex Sprenger in Berlin, names besides the tributaries in Sagháníán six tributaries of the Jaihún, viz., the river of Halbak, the Barbán, the Fárghar, the river of Andijarágh,† the Wakhsh-áb,‡ and the river of Kowádián.

It would be a task well worth the trouble to compile the whole of the notices that we possess regarding the Oxus Basin. Other labours render it impossible for me to undertake this now, or at any early date. Ardently we hope that we shall not have to wait long for Sir Henry Rawlinson's continuation of the brilliant monography of the Oxus, of which he gave us the commencement in the *Journal of the Royal Geographical Society* for 1872. The material in existence is far from being exhausted, though H. Yule's Essay, and Fedtschenko's additions to it, have contributed much that is valuable.

P. L.

13th August, 1875.

* [This part is to me quite unintelligible, and I can't but think there is some corruption of the text.]—Y.

† [My belief is, that we shall eventually be able to identify these obscure rivers with the Murgháb, Wanjab, and others entering the Panja on the right bank, in Shighnán and Darwáz].—Y.

‡ [If this is correct, the river of Kuláb cannot be identical with the small Surkháb, entered in John Walker's map (after Wood) as entering the Oxus opposite Yangkilá, as has been assumed in Colonel Walker's last edition of his four-sheet map. And the fact that we have here no mention of Khwáling, rather favours my belief that Khwáling and Baljuwán are the same place. (See *Geographical Magazine*, May, 1874, p. 52.) This idea I see Colonel Walker has not accepted in his late edition.]—Y.

the expedition began to feel the evil influences of climate to which they had been exposed. In Kurghán-tuba Mr. Vishniefski and the interpreter Kasbekoff both fell ill of fever. Two Cossacks and a Jigit were also prostrated with fever, and delirium. Mr. Vishniefski was at the same time suffering from rheumatism in the head and in the foot, the consequences of a chill which he had taken, in part from riding through the deep hill-streams, and in part from the cutting cold winds which blow out of the gorges.* Hence the expedition was compelled to change their plan, and instead of visiting the confluence of the Panj with the Wakhsh, they had to proceed straight to Kobádián, with a slender hope that circumstances might yet permit them to get to the mouth of the Wakhsh from the town last-named. Meanwhile at Kobádián Mr. Vishniefski got so much worse that his travelling further was out of the question. In order not to lose time Mr. Mayef sent forward Mr. Schwartz, the astronomer, with an interpreter, three Cossacks, and some Jigits to Baisun, in order to take astronomical observations and fix with absolute accuracy the latitude of that place. This was all the more necessary as Mr. Schwartz had already on the outward journey taken an observation at Baisun of the lunar occultation of the star *K Capricorni*. Moreover, Baisun was the terminal point of the first section of the astronomical portion of the work of the expedition. Messrs. Mayef and Vishniefski stayed behind at Kobádián, with two Cossacks and two Jigits.

The health of Mr. Vishniefski improved after some days, and the whole expedition then reunited at Baisun. Thence they took their homeward way by the Kaltaminar road to Shahr-sabz and Samarkand.

On the 13th June the party reached Shaar† after having spent forty days in traversing the territories of Hissár and Kuláb. On the 16th June they presented themselves before the Amír, who, the day before had come from Kitáb to Shaar, the ancient city of Timur.

The result of this expedition will be an accurate map of the territory of Hissár and Kuláb, based upon fourteen points determined astronomically by Mr. Schwartz. Throughout the journey Messrs. Mayef and Vishniefski made route-surveys, and the map of the country travelled over was plotted daily, with all the settlements and other points indicated. Also during the whole journey a special field book of route was kept in which the distances (in *Tash*) and the compass-bearings were exactly noted. Finally, the entomological collection made by Mr. Mayef has been made over to Mr. Oshanin to classify.

(A further and more detailed description of this journey is expected at an early date.)

Translator's Note.—Being, where I am, almost without needful books and maps, except the last edition of Colonel Walker's 4-sheet map of Central Asia, I do not attempt here any comment beyond the few explanatory notes with my initial. To me and to some others, these seemingly dry notices are of almost intense interest! No territory has been so baffling to our attempts at map-making as this, and no existing

* The natives of Hissár, Karátágh, Doshambá, and other places in the hills wear long fur tunics throughout the summer, and in spite of this suffer very commonly from rheumatism.

† [*Shaar* would seem to be a popular name of *Shahr-sabz*].—Y.

map will much help the reader to follow these somewhat tantalizing notices. The best for the purpose will probably be that published (from the Russian) in *Ocean Highways* for August, 1873. It is gratifying to think that we shall at last have descriptions, and, we trust, views, of such places as Hissár, Deh-i-nao, Kurghán-tapa, and above all of that famous *Stone Bridge* which was a landmark to geographers nearly 1000 years ago.*

It is disappointing, I must confess, to find that the precise site of the famous Iron-Gate has not yet been identified. Surely the name of the station Darband must point to it? For the famous barrier-city of Darband on the Caspian also was called, like these Transoxian Gates, the *Iron-Gate*, and *Kohluga*. † I miss also in this preliminary report any notice of another famous place, Chaghánián. The misfortune which cut short the work of the expedition deprives us too of the precise determination of the junction of the great Wakhsh River with the Wakhán River or Panja Oxus; and we look anxiously for their map, for comparison with the latest representation on that subject by "the Havildár." The certainty that we now have as to the true application of *Wakhsh-áb*, and the passages from Ibn Dasta which Mr. Lerch has quoted in his notes, as to the co-ordination of the two great confluent Wakh-áb and Wakhsh-áb, recall a note of my own which I will here partially repeat:—"This latter form Wakhsh seems to have originated *Oxus*, whilst Wakh is better represented by *Ochus*. And the evident confusions in classical geographers about the Ochus, which seems at one time to be a river of Aria, and at another time a great confluent of the Oxus, may have relation to these circumstances." ‡

H. YULE.

BEECH-HILL, HADDINGTON, *October 8th, 1875.*

THE VOYAGE OF THE 'CHALLENGER.'

VIII.

ON entering Albany Pass, the naturalists were greatly interested in the remarkable appearance of the gigantic ant-hills scattered profusely about on each grassy slope. These ant-hills are red clay pyramids not less than 12 feet high, and they add much to the desolate appearance of the country.

Cape York, upon which is the settlement of Somerset, forms the north-eastern extremity of Australia and the southern limit of Torres Strait. The settlement was established, in 1864, as a place of refuge for shipwrecked persons, and it is still maintained by the Government of Queensland, the monthly mail steamers each way between that colony and Singapore making it a port of call. It is also of great advantage to the numerous small craft engaged in the pearl fishery,

* The true position of this bridge, near Norak, is that assigned to it by Fedchenko (see *Geographical Magazine*, May 1874, p. 51). And I am surprised to see that in Colonel Walker's map that indication has been overlooked.

† This puzzling term seems to be Mongol = Barrier, and to be the same word as Kalghan, the name given by Mongols and Russians to the Chinese barrier city on the Kiakhta road.

‡ See Essay prefixed to Wood's Oxus in 1872 (first issue, p. xxiii). Nothing in these remarks is inconsistent with Major Herbert Wood's speculations about the Ochus in the *Geographical Magazine* for September.

carried on in the neighbourhood of Osman's Reef and the Jardine River, and which is yearly becoming of greater importance. The settlement consists of half a dozen houses, and one of these is the only store in the place, the other dwelling-houses being those left behind by the detachment of Royal Marines when they resigned their post to the Queensland police in 1867; one of them is now occupied by the London Missionary Society, who have already established themselves on the south-eastern shores of New Guinea, having pushed their way from the islands in Torres Strait to the mainland.

There has long been a doubt as to the best position for a settlement in Torres Strait; the present site at Somerset being objected to as being out of the reach of sailing vessels passing through the Strait, and also, of a shipwrecked crew coming from any of the reefs near the main route through the Barrier Reef, by the north-east channel. The strong tides at the present anchorage will always necessarily prevent the visits of large sailing vessels, and it is reported that Hammond Island, whilst being close to the passage through which every ship is obliged to pass, has a good harbour on its southern coast, to the north-east of Friday Island; but as regarding the question of the healthiest situation, no other place in the neighbourhood can compare favourably with Somerset, exposed as it is to the full strength of the south-east trade, and having a less rainfall during the north-west monsoon than the islands on the straits: it is besides the most suitable for a cattle station.

It is very doubtful if Somerset will ever become a settlement in the true sense of the term, as there is not sufficient inducement to tempt men to take up their residence in the locality, the mere calling in of passing ships being very precarious. The soil is poor and not capable of much improvement; the country round consists of low, wooded hills, interspersed with valleys and plains of considerable extent, backed by the dull sombre vegetation so peculiarly Australian; the whole appearance being hot and dusty. During the stay of the 'Challenger' the naturalists added considerably to their collection.

On the 8th of September the 'Challenger' left Somerset, and anchored the same evening between Hammonel and Wednesday Islands. The following day they cleared Torres Strait and visited Booby Island. This island—so named from the vast number of birds of that species which frequent it for breeding—may be considered the western outpost of Torres Strait. It is but a rock, fringed by a narrow coral reef; but as the generality of ships making or clearing the Strait, sighted it, it became of some importance, and owing to its favourable position, a supply of provisions was generally left, for the use of shipwrecked seamen, deposited in a cave at the base of the cliff on the west side of the island. This store was renewed from time to time by passing vessels; but at the time of the 'Challenger's' visit a small quantity of biscuit only was found, and no water, so the supplies are not to be depended on. A chest or cask was kept on the island and labelled *Post Office*. In this a book was kept in which those who visited the island recorded the name of the ship with the date, &c., and before the mails became so regular, letters were left and taken charge of by the next vessel that passed, according to where she was bound. It was not the

breeding season and consequently no eggs were obtainable.

From Booby Island the 'Challenger' made a straight course for the Arrou Islands, sounding on the way through the shallow Arafura Sea, which at one time, as proved by Mr. Wallace from the similarity of fauna and flora in Australia and New Guinea, formed part of a great continent when those two vast islands were united. On approaching the south part of the Arrou Islands, they ran into shallow water, which caused them to anchor for the night; and well they did, for the next morning they found themselves near some hitherto unknown and dangerous reefs. Having weighed and cleared these dangers, they anchored in Dobbo Harbour, off the village of Dobbo. This harbour is on the south-west side of the Arrou group, formed by the two islands of Wamma and Wokan, and affords secure anchorage in both monsoons. The village, which has some notoriety from its trade, is built on a sandy spit $2\frac{1}{2}$ miles within the harbour, the spit itself affording shelter to the trading vessels frequenting it, anchoring eastward or westward of it according to the prevailing monsoon. In the early part of the west monsoon several vessels from Sourabaya in Java and other places, visit the port. The trading season was nearly over when the 'Challenger' arrived, the last of the praus having left the same morning on their return to Malacca. The resident population are traders, Chinese and Malay, who, with their slaves and servants form a large community, and in the height of the trading season number about 1500. The principal business carried on is vessel and boat building: of the former, one of about 150 tons burthen was then nearly ready for launching, and a number of praus were preparing for the pearl and trepang fisheries that are carried on off the east coast of the Arrou group, between the end of October and the beginning of December, before the wet season of the north-west monsoon sets in.

The Dutch exercise a species of sovereignty over these islands through the Resident at Banda, who visits them periodically. On the 'Challenger' coming to an anchor, she was visited by two men in authority, having silver-headed sticks with the Royal arms of the Netherlands on them; they were severely dressed in European costume of a fashion long passed away, with the exception of the everlasting tall black hat; the individuals within these state dresses look exceedingly hot and uncomfortable; but immediately the official visit was over, the tall hat and the rusty-black tail coat and trousers soon gave place to the more appropriate, and decidedly more comfortable dress of the country. In the afternoon the principal traders (Malays from Macassar) and Dutch missionaries called on them. These missionaries are established at the island of Wamma, and on the north-west coast of Wokan: they have made some progress in christianizing the natives, but strictly speaking they are schoolmasters and not missionaries. Slavery to some extent still exists, although legally abolished by the Dutch Government.

The settlement consists of several thatched huts, which are not built on piles in the usual Malay fashion, but on the ground. The boats on the beach form a shelter for many of the inhabitants. Wokan is separated from Wanembai by a strait. A party landed on Wanembai close to some huts, and were received by the natives in a

very friendly manner, accompanying the naturalists into the bush as guides, the paths being narrow, slippery, and tortuous. The native men are as dark as the Fijians, and only wear the tapa round the loins; the women were not to be seen; but if their looks were in any way comparable to the men, the visitors did not lose much by the omission. These people live in communities, several families residing under the same roof, the only separation being a low planking about a foot from the ground, denoting merely the boundary line of each household, and as they consume a large quantity of arrack, it may be presumed that the state of morality existing cannot be very severe. They gain their living by shooting the birds-of-paradise, which are greatly in demand by the Chinese, also by collecting from the outer reefs of the island large quantities of tortoise-shell, pearl shells and trepang; others are engaged in procuring the edible birds' nests (the nests of a species of sea-swallow) also in great demand by the Chinese. In the pursuit of birds-of-paradise they mount a tree near the spot where the birds congregate, and from this vantage shoot them with arrows having a knob at the end instead of a point, in this way stunning them, and preserving the plumage from injury. The Chinese purchase these birds for two dollars or five quarts of arrack, the natives generally prefer the barter, by which the dealers realize a larger profit. The tortoise-shell is sold at about fifteen shillings a pound, and the pearl shell for two. Some fine specimens of king birds-of-paradise were shot by the naturalists, and a botanical collection made.

The expedition left Dobbo on the 23rd of September, and reached Little Ki Island the following evening, having obtained two soundings between the groups of islands in 800 and 580 fathoms, green mud. As the largest island of the group was approached, several boats full of natives boarded the ship, but as they were all more or less afflicted with skin disease, they were soon cleared out. On anchoring at Ki Doulan this malady was found not to be so prevalent. The Rajah and numbers of natives visited the ship. The chief trade of the place is boat-building, for which they are locally famous. The natives are an active race, as they proved by running over the rigging like cats, in a manner that could scarcely be imitated by the seamen themselves. None of the women were to be seen; being Muhammadans, they are naturally and religiously jealous of them, and kept them out of sight. Some fine pigeons, weighing two pounds each, were taken.

Ki Doulan was left early on the morning of the 26th, and crossing the Banda Sea, in which a depth was obtained of 2800 fathoms, with a green muddy bottom, they arrived at Banda on the 29th. In the serial temperatures taken in the deep soundings, the same temperature, $37^{\circ}.5$ was found from a depth of 900 fathoms to the bottom, indicating that the Banda Sea is enclosed by a rim or border, with only 900 fathoms in its deepest channel. The Banda Islands are ten in number, lying near each other, the harbour being formed by two of them, the Great Banda on the south side and Gunong Api (Burning Mountain) on the north.

The largest island of the Great Banda group is thickly planted with the light-green leaved nutmeg trees, relieved by the dark-leaved, tall, canarie trees,

which were left to protect the more delicate spice trees from the strong winds when the forest was cleared for planting them. Large groves of cocoa-nut plantations and other trees make the whole prospect pleasing. The island of Gunong Api, with its crater summit 2200 feet high, rising in the centre, always emitting smoke. A party ascended the mountain, which, although steep, is not difficult of ascent: they took two hours in reaching the summit.

The town on Banda Neina is prettily laid out. At one end is the Dutch garrison, and at the other the Chinese, Arabs, &c. There are three piers running into the sea. The roads are in excellent order, being kept so by convicts: a row of green trees on each side of the road gives them a refreshing coolness.

An excursion was made to one of the largest nutmeg plantations, the Governor accompanying the party in the steam-pinnacle of the 'Challenger,' while his canoe, gaily decorated and double-banked, attended them, the men keeping time with their paddles to the sound of tom-toms and gongs. The crew of the canoe tried their utmost to keep pace with the steam-pinnacle, but in vain, and were reluctantly obliged to give up the race. The estates on which the spice is grown were formerly a Government monopoly, worked by slaves, but since the abolition of slavery the monopoly has been surrendered, and any one is free to clear the jungle and plant the spice-giving trees; but the scrub is so dense that it is difficult to conceive how the cost of labour in clearing can be made profitable, and few indeed undertake to do it, the addition to the cleared land being generally made in old and well-established plantations by extending the borders little by little yearly. The labourers are Javanese, who engage themselves for a term of years; but the enervating climate and the prodigality of nature, in furnishing food for a week by one day's labour, renders the coolie labourer indolent.

On the evening of the 2nd of October the expedition left Banda, and steered for a position in which it was stated there was a depth of 4000 fathoms; but as it was ascertained to be from a report of a Dutch officer some twenty years ago, when appliances for deep sounding were in their infancy, and as in a position about 5 miles from it the 'Challenger' found but 1450 fathoms, which would give an incline of one in two for 5 miles, the sounding is supposed to be erroneous. The disappointment at finding the water so shoal was great as the trawl had been let down previously to sounding with 4200 fathoms of rope; they were, however, repaid by a rich haul, in which were some pieces of drift-wood, leaves, and seed, showing that these vegetable substances are capable of becoming water-logged, and finally sinking to the bottom.

On the 4th of October the green hills of Amboina, another of the Dutch Spice Islands, was seen, and the ship anchored in the port the same day. Here a large depôt of English coal was found, and a convenient jetty, alongside which the 'Challenger' was secured and 150 tons taken on board.

The islands as a group are frequently known as the Clove Islands, and Amboina is the chief residence of the Dutch Government of the Molucca Islands. It is the largest of the group, being about 34 miles long north-east and south-west. The bay is formed at the entrance by two high points. There is an inner harbour suitable for small vessels in stormy weather,

but the entrance to it is narrow, and the place itself very unhealthy for Europeans.

As Banda produces the best nutmegs, so Amboina produces the best cloves. Pine-apples were plentiful but no other kind of fruit was obtainable. During the stay of the ship the monthly mail-steamer from Sourabaya, calling at all the Dutch ports, arrived, but as no arrangements had been made to meet the contingency there were no letters for the 'Challenger.'

On the 10th Amboina was left, and, passing through Manipa Strait and the Molucca passage, Ternate, off the west coast of Gillolo, was reached on the 14th. The island is near the north end of the Dutch possessions and forms one of a group of ten volcanic cones which may all be seen at the same time. The slopes of the hills, which extend high up, are rich in cultivation, and produce a greater variety of spices than the other islands, the volcanic soil proving suitable for all: they were formerly considered the principal of the Spice Islands, but had ceased to be so from the destruction of the trees by the Dutch. They are, however, regaining their reputation for spice-bearing and nutmegs; cinnamon and cloves are grown to a great extent; pepper is largely cultivated, as also are coffee and cocoa: the sago-bearing palm flourishes in every part of the island. They also now produce what the others do not, and which is more thought of by the passing seamen, viz., a tolerably good supply of provisions, in sheep, fowls, vegetables, and a greater variety of fruit; pine-apples, oranges, lemons, bananas, &c., being plentiful in their seasons. Ternate is about 6 miles long. Tidone, another island of the group, about the same size, being the place of trade with New Guinea, numbers of birds-of-paradise were procurable.

The ascent of the volcano of Ternate, 5600 feet high, was attempted by the botanists, but they failed to reach the summit in consequence of the burning sulphurous earth and insecure footing.

Leaving Ternate, the expedition proceeded with fine weather and smooth water to the north-westward. The deepest sounding obtained in the Molucca Sea was 1200 fathoms, with a temperature of 35° 2'; and as the serial temperatures decreased gradually, this sea is open to the Pacific ocean to at least that depth. The temperature at 200 fathoms was nearly the same as that found near the Equator in the Atlantic, but the surface-water being several degrees warmer, the decrease is more rapid.

Proceeding through the passage between Banka Island, off the north coast of Celebes, and Bejaren Island, the positions of those and the neighbouring islands were fixed, and a sounding obtained in 2150 fathoms, red clay, when only 23 miles west of Maquiliere Island. The serial temperature proved that the water in the Celebes Sea is cut off from communication with the surrounding seas below 700 fathoms, the temperature of the water below that depth being uniform at 38° 6', this agreeing with the observations of Commander Chinmo. On the 22nd of October another sounding was obtained in 2600 fathoms, when about 40 miles from the land of Point Pola, south coast of Mindanao, with the same result as to temperature. The next day the 'Challenger' anchored at Samboangan, Basilan Strait. Here they found a state of war existing between the Spanish and the

Sultan and several Spanish gun-boats were blockading the islands.

Leaving Samboangan on the 26th, they proceeded to Ilo Ilo, Panay Island, and on the way sounded in 2550 fathoms with a bottom temperature of 50°, the same as that at 400 fathoms. They arrived at Ilo Ilo on the 28th October, where they obtained a supply of coal. The town of Ilo Ilo is considered the second in the Philippine Islands; but in saying this it does not say much for the first, for it appeared a most miserable place, low and swampy, with every appearance of malaria abounding in the vicinity. On the 31st the 'Challenger' left for Manila, and arrived in that port on the 4th November, having passed to the northward by the inner passage east of Tablas and Mindora. The stay at Manila was sufficiently long to prove how very unsuitable a port it is for refitting a ship and recruiting the men; compelled as the ship is, to anchor at a distance of nearly 2 miles from the shore, with a temperature ranging from 75 to 85 degrees, with an oppressive atmosphere, the temperature of the water being constant at 82 degrees. The public houses open to the crews are dens of infamy, in which the men are hounded, robbed and turned into the streets, without any chance of obtaining remedy, owing to the insufficiency of the police.

Of course Manila is well known as the capital of the Philippine Islands and for its celebrity in producing good tobacco, which is cultivated to the detriment of all other crops, the culture of it being obligatory, and for which, when produced, the cultivators are badly and uncertainly paid by the Government, who hold the trade in it as a monopoly; there has, however, been a great development in the growth of sugar lately. If the islands of this Archipelago were properly cultivated, they would become one of the largest producing countries in proportion to their size. The Chinese are the labourers: they are here, as at other places, looked on with a jealous eye, but although they are taxed beyond any other class, they thrive. The city is clean.

The 'Challenger' left Manila Bay on the 11th. The north-east monsoon was met 30 miles N.N.W. of Piedra point, at which position a sounding was obtained in 1050 fathoms, the temperature at the bottom being 36°·3, and as the decrease of temperature was gradual to the bottom it shows that this sea is open to that depth between Formosa and Luzon.

The 'Challenger' reached Hong-kong in safety on the 16th November, 1874, and, shortly after, Captain Nares received a telegram from England offering him the command of the Arctic Expedition, now making its way towards the North Pole under his command. The news, gratifying as it must have been, was the cause of much regret both to Captain Nares and to those with whom he had been associated for two years; Captain Nares himself would have preferred completing the task he had so successfully carried on thus far; and those with him, though well understanding the reasons of the selection of their chief as the leader of the Arctic Expedition, could not but feel sorry at their own loss, and it was with no slight regret that farewells were exchanged.

J. E. DAVIS.

RECENT JOURNEYS IN PARAGUAY.

(Continued from p. 313 of our last number).

Orography.—In considering the elevation or relief of the land in Paraguay, the general level of the lowlands in the west, and of the Chaco, may be taken as about 250 or 300 feet above that of the sea, and no part of the country appears to be much higher than 2000 feet. The eastern or Paraná side of Paraguay is, however, much higher than the western. A chain of heights, generally termed the Cordillera, runs southward through the middle of the country parallel to the Rio Paraguay and the Alto Paraná, ramifying east and west in some districts. A mass of elevated land in the west, isolated from the central chain by the lowlands of the Upper Tebicuary-mi and the Manduvirá, and another plateau in the south, which culminates in the Cerros of Santa Maria and Santa Rosa in the Missions, are the chief elevations besides those of the Cordillera. The northern portion of what is termed the Cordillera has no title to this name, since it proves to be distinctly a southern continuation of the broad plateau of Brazil. Where we passed along it between the sources of the Apa and those of the Ypané rivers, it is a broad height, curving and undulating gently on each side of the water-parting, averaging perhaps 20 miles in width, and a little over 2000 feet in absolute height, having a distinct western declivity, from the base of which the slope is gradual to the river Paraguay. The barometric sections which I have been able to make of this part of the country, and which, I believe, give the first approximately accurate representation of the height of this part of South America, were taken on two separate lines from the river to the summit of the plateau, and confirm this view; I have consequently ventured to name this part of the central heights the *plateau*—not the Cordillera, as formerly—of San José Amambaya. The more northerly section crosses the midst of the country, in which an apparently high range, termed the "Sierra de las Quince Puntas," is laid down upon the map of Mouchez, and others following this one; we certainly crossed no such range, nor were any conspicuous heights to be seen from the route, saving a few isolated outliers of the plateau in the east.*

Further south, between the heads of the Ygatimi and Xexuy rivers, the plateau narrows, and is properly

* In computing the barometric observations made for elevation, which consisted of simultaneous morning and evening readings of two standard George barometers, one noted by an observer in Asuncion, the other on the route, I have assumed the height of Asuncion as 250 feet above the sea: this height, giving a fall of about 1 foot to each 4 miles of the river, seems rather under than above the truth. In his Tables of Barometric Elevation (App. p. 607), Capt. Page gives Asuncion 182 feet above Buenos Ayres; Buenos Ayres 50 feet above the sea; Asuncion 232 feet above the sea; but in his Meteorological Tables (p. 609) Asuncion is stated to be 307 feet above the sea. The barometric readings taken recently in Asuncion, and extending over more than a year, will probably afford a more true approximation to the height of the capital. I take this opportunity to express a high opinion of the working of Captain George's barometer in this, perhaps its earliest, practical testing. After three months of the roughest cart travelling in the north of Paraguay the tube and cistern returned in perfect safety in their tripod case; the barometer was filled, generally twice a day, morning and evening, in the tent or in the open, under all sorts of weather, a satisfactory vacuum and steady readings being almost always obtained at the first trial.

termed the Cordillera of Maracayú ; a high branch of this Cordillera running eastward, terminates in forming the great salto of Guayrá. In the centre of the country the heights are named the Cordillera of Caaguasú. As far as I have been able to learn, these are not so high as the parts more to the north. Between these and the portion known as the Cordillera of Villa Rica, a break occurs where the Tebicuary passes out from behind the central ridge, and the track from Villa Rica to Caaguasú lies over almost level ground. Seen from the village of Villa Rica the Cordillera of its name shows a knot of dark, densely-wooded summits, probably not far short of 2000 feet in altitude.

The southern Cordillera seems to fall back, curving round the head of the basin of the Tebicuary, and terminates in a series of bluff heights on the Paraná between the marshes of El Carmen and Encarnacion.

The isolated western heights of Paraguay embrace first a plateau, round the western corner of which the Rio Paraguay bends, at, and for some distance below, the capital, which stands on its north-western slope : on the other sides this plateau falls with a marked edge to the basin of the lagoon of Ypoá and northward to the valley of the Salado. On an average it is about 200 feet above the level of the Paraguay (or about 450 feet above the sea), but both on the northern and southern edges there are higher points, such as the cerros of Areguá, Ibitipané, and Piraju, and that called "de dos Cruces" over the village of Jaguaron. Its most southerly heights, beside the Paraguay, are the Lomas Valentinas, the scene of several battles, during the war, as well as between the Payagua Indians of the river and the first Spanish conquerors.

The Cordillerita, or Cordillera of Altos, on the opposite side of the Salado, has an abrupt face of wooded slope to the south-west, and is higher than the plateau just described, having probably 600 feet of relative height ; to north-east it descends with many folds, enclosing beautiful valleys, to the Rio Pirèbebuy. The heights of the plateau and the valleys of this Cordillerita are the most populous districts of Paraguay. At the head of the Salado or Piraju valley the Cordillerita turns abruptly to the east, and the corner is marked by two very conspicuous hills, Cerro Costa and Cerro Santa Tomas, rising above the village of Paraguari. The former of these cerros, measured by barometer, is 850 feet in relative height, or about 1280 feet above the sea (850 feet above station at Paraguari: the station, by levelling, being 177 feet above Asuncion). Azara gives the relative height of this hill as 370 varas, or 1023 feet. From the Cerros of Paraguari the ridge runs east as far as a steep ascent called Sapucaí, which is crossed in the main track from Paraguari to Villa Rica, and there it turns again abruptly, terminating about 20 miles further south in the remarkable cone named Cerro Tatuquá, "the hill in the burrow of the Armadillo," so named because the upper portion of it rises in a perfect cone out of a wide crater-like hollow. Several high points occur along this southerly ridge—cerros Chircal, Chauri, and Apiragua ; and on its eastern side, somewhat detached from the ridge, is the fine, sharp-topped hill of Ybitimi.

A very remarkable knot of hills named the Cerros Acaay rise west of the ridge just noticed, and form a

prominent object in the view ; they are covered densely with dark woods, and present a steep escarpment on every side : a deep basin or hollow is said to occur in the midst of the knot. This mass and the Cerro of Tatuqua, appear to be not less than 1500 feet in absolute elevation. Between Acaay and the Cordillerita north of it lies the great flat grass plain of Paraguari : from its level there rise two or three isolated and wooded hills of perfectly conical shape ; the most remarkable of these are the Yarigua-ú or Guasú and Yarigua-mi, two symmetrically formed cones, rising about 600 or 700 feet above the plain.

The hilly and stony district of Caápcu forms the southern division of these western heights of Paraguay. Immediately west of the Capilla there is a mass of hills, of moderate elevation, filling up the country to the edge of the marshes of Ypoá, and terminating on the south in a line of summits facing the Tebicuary. The Cerro of Santa Maria and the little chain of hills of Santa Rosa are the highest points of the plateau, which runs north-west to south-east between the Tebicuary and the Paraná at San Cosme. The plateau appears to be about 200 feet, the tops of the cerros 500 or 600 feet above the esteros of the Paraná, or from 900 to 1000 feet above the sea.

Population.—The more civilized population of Paraguay, which is confined exclusively to the western portion of the country, consists of a mixture of the Spanish settlers with the original inhabitants, a part of the great Indian race of the Guarani, who occupied the greater part of South America from the Orinoco to the Middle Paraná, and a small negro element, derived from the slaves imported in earlier times by the Spaniards. These elements are still to be found distinct, as well as in every stage of intermixture. Among foreigners the Italians, who carry on the greater part of the traffic of the river, and the business in the towns and villages, form a considerable part of the population along the river Paraguay.

The first census of the people of Paraguay is that given by Azara, from which we learn that in 1792 the civilized population of the country amounted to 97,480, of which number 5133 were Spaniards. In 1857, according to a census then reputed to have been made under the superintendence of the elder Lopez, the population had increased to 1,300,000. This number has, however, been disputed, and was said to be much exaggerated.*

There can be no doubt, however, that previous to the war, begun in 1864, the country was in an exceedingly prosperous condition, and the remains of now deserted habitations in every part of the country argue a very considerable former population. At the present time, decimated by the long war, and scattered partly by voluntary emigration to more prosperous districts of the Argentine Republic or Brazil, the civilized population of Paraguay does not appear to exceed 100,000.†

* In 1860 M. Demersey estimated the population at 600,000, which number he thinks rather over than under.

† From estimates made in, or given me by the chiefs of forty of the villages of Paraguay, their total population amounted roughly to 8800. Allowing that the remaining twenty-three villages have the same average of inhabitants, the whole village population of Paraguay (excluding the capital) at the present time amounts to about 13,800. Several more or less accurate estimates given me of the population of the districts belonging to some of these villages, give an average of rural population in

The greater part of the northern districts of the country are now almost uninhabited: the department of San Salvador, between the Aquidaban and the Apa, is a complete desert, excepting that the wild Indians from the Chaco have occupied the abandoned capilla, on the bank of the Paraguay. The districts of the Missions south of the Tebicuari are now also all but deserted, though the frequent ruins and plantations rapidly going back to a wild state show that the former inhabitants must have been numerous. The bulk of the remaining population has drawn in round the capital, the heights of the plateau of Asuncion and the valleys of the Cordillerita being the only really peopled districts of Paraguay.

The whole area of the eastern watershed of Paraguay, as well as some parts of the northern interior on the western side, are still in possession of the original Indian tribes, as free and almost as undisturbed as they were before the Spanish conquest. A good deal of confusion appears to exist as to the names and localities occupied by these tribes of Paraguay and the Chaco, a babel introduced by the Jesuit geographers, who set down on their maps, under the name of its chief, each rapidly changing section and subdivision of a tribe, till it is not surprising to find one author complaining that he cannot find room on his map to set down the names of all of them: but even in the most modern maps the names of tribe long since extinct are often conspicuously placed. The wild Guarani in Paraguay, at the present moment, are in two divisions nearly allied to one another.

The Canguás*, or forest people, occupy the dense woods of Northern Paraguay, and are found over the whole stretch of country which extends from the Aquidaban across the Cordillera to the Upper Paraná. They appear to be a mild inoffensive people, keeping themselves strictly apart, living in the densest part of the forest, cultivating a little mandioca, and subsisting by this and the chase, or by fishing in the rivers. Their arms are still the bow, or a short spear or ironshod pike. The seat of the chief of this tribe, I was

each district of six times that of the capilla, or chief village, or of about 83,000 in all; adding 10,000 as the population of Asuncion, and another 10,000 as the estimated number of wild Indians within the limits of Paraguay proper, a total of 103,000 is obtained. Since making the above estimate, I have seen in the latest edition of *Behm's Bevölkerung der Erde*, a statement of the population of Paraguay in 1873, ostensibly from a census taken in that year, which gives the following figures:—

	Men.	Women.
Under 14 years	39,507	46,572
From 15 to 24	15,683	45,567
Above 25 years	13,663	60,678
	<hr/>	<hr/>
	68,253	152,817
	<hr/>	<hr/>
Total	221,070	

The only way in which such a census could have been easily made in the country would have been by obtaining returns from each department, collected therein by its "gefe" or chief: it is strange, therefore, that though I constantly sought information as to population from the "gefes," not one of them ever mentioned this census, though they were able to give approximately the number of people in their department. The only approach to a census that I heard of, in any district, was a numbering of the inhabited houses in the department of San Cosme, which took place in 1871. I may be mistaken, but the very minuteness of this census of 1873 leads me to doubt it, although the general idea it gives of the proportion of the sexes, according to age, seems to be correct.

* More correctly Caaigua; Ca, the forest; guá, pertaining to.

informed, is at a hill, named "Quati," near the Aquidaban, but in what precise locality I was not able to determine.

The other division of the pure Guarani in Paraguay is that of the Guayanas (not to be confused with a non-Guarani tribe of the same name, which formerly inhabited the country east of the Uruguay), who appear to occupy chiefly the basin of the Munda-y, or the space between the Cordillera of Villa Rica and the Upper Paraná. Less barbarous perhaps than the Canguás, some at least of the Guayanas still profess the christianity they learned from the Jesuits, and have imbibed sufficient civilization to find it to be to their interest to work in the "yerbales." The two solitary villages on the bank of the Upper Paraná, Pirapitai or Villa de Azara, and Tacurapucú are peopled by these Guayana yerba workers.

There are several tribes shut in or embedded as it were within the Guarani area by some strange circumstance, which differ completely from the enclosing people in race, language, and customs. Of this class are the wandering Tupis, the old allies of the Mamelukes of San Paulo, and still the terror of the more peaceable Indians of the Upper Paraná; the Ibitirocays, another smaller tribe, visited last year by the Boundary Commissioners, who found them on the banks of the Santa Teresa tributary of the Upper Paraná, are also foreigners within the Guarani region, their language being totally different.

Passing over to the western side of Paraguay, we find the little remnant of the once great tribe of the Payaguás, a dozen or two Indians, settled in a few huts on the bank of the lagoon above which Asuncion is built. This tribe was the first to be encountered by Cabot in ascending the Paraguay, and its two divisions then held command of the whole navigation of the river; from them, indeed, it is supposed by Azara that the river, and thence the country, was named. After long years of conflict with the Spaniards, the Payaguas at length found themselves compelled, for their preservation, to enter into a sort of offensive and defensive alliance with the invaders (in 1740), and both tribes had settled under the shelter of Asuncion in 1790.

The Indians of the portions of the Chaco which border upon Paraguay Proper, seem to resolve themselves at the present time, into two chief tribes, the Lenguas (perhaps rather the Mbayas) north of the Pilcomayo, and the Tobas between that river and the Vermejo, and about its lower course. The name Lengua (their own name for themselves in Juiadge) was given to the tribe from the peculiar form of their *barbote* or chin ornament, which being in the form of a semi-circle of wood passed into a slit in the lower lip, gives the appearance of a hanging tongue. They are nomadic in habit, fierce and intractable, and devoted to the chase. Azara tells us that, in 1724, the nation was on the point of expiring, and that it was then reduced to fourteen men and eight women. Either, then, the Lenguas have attained a new strength, or as I think more probable, their name has passed over to other tribes than that which originally bore it, for the Indians called Lenguas appear to be very numerous at the present time. Two allied tribes the Guanás and the Mbyas, appear to have moved about a great deal between the Chaco and Northern Paraguay. At

the time of the Conquest, the Guanas inhabited the Chaco from 20° to 22° lat., but in 1673 a large part of their nation crossed the Paraguay; of these one horde seems to have settled down north of the river Xexuy and in other places, and to have become permanent inhabitants; part also became incorporated with the Mbyas, a tribe which crossed from the Chaco to the Paraguayan side some years before the migration of the Guanas, and which during nearly a century was in constant warfare with the Spanish settlers, advancing sometimes nearly to Asuncion. In 1796, however, they retired to the north of the tropic.

The name of Lengua of the present day probably includes some part of these tribes, and their invasive instincts do not seem to have diminished: last year, about this time, a large body of them taking advantage of the unguarded state of the river frontier, crossed the Paraguay and occupied the greater part of the country between the villages of Concepcion and San Pedro, driving out 96 Paraguayan families.

The Tobas are also a nomadic race, but appear to congregate chiefly at present about Lower Vermejo, outside the Paraguayan area.

The name Guaycuru was that of a noble race of Indians, who formerly inhabited the Chaco opposite Asuncion, but the nation was completely destroyed before the beginning of this century. Although the name is still used in Paraguay to designate the Chaco Indians in general, just as that of "Camba" is applied to the Brazilians, or as we might use the term savage or barbarian, it has now no special application whatever.

Yerba.—Yerba*, or Paraguay tea, the well-known staple product of the country, is derived from the twigs and leaves of a bushy evergreen tree, which is scattered, more or less thickly, through the wild forests of the central Cordillera from north to south. The districts in which it is most abundant are hence termed Yerbales, and are named from their locality; the chief are the Yerbales of Chiriguélo and Tacurupytá in the extreme north; of Concepcion at the head of the Ypané; of Rosario and San Pedro, in the basin of the Xexuy; of Caaguasú and Tacurupucú, on the shed to the Paraná; and of Yuti and Jesus, in the south. The Yerba trade is a government monopoly. Having obtained a concession, the Yerba speculator may take his gang of peons to any chosen Yerbal: there he settles down during the time that the trees are in "season," or for the six months of summer and spring. The processes of gathering the twigs and leaves, drying these over a fire, and afterwards beating them into small fragments, and packing the tea thus prepared in hide-bags, are simple and rude in the extreme. At the present time Yerba is not a cultivated product in any part of Paraguay. In former times, however, the shrewd Jesuit missionaries, recognizing the great advantages and conveniences of having the Yerba close at hand, made large plantations of the tree about the southern reductions, and at Santiago, it is said that a grove of not less than 20,000 Yerba trees flourished at the end of last century. It is surprising that, considering the value of the product to Paraguay, no subsequent efforts have been made to extend the

cultivation of Yerba; but it is probable that the tree yields a finer tea in its native state and habitat than when cultivated, as the Missions Yerba was not considered superior. The trees of the far northern Yerbales yield a finer tea than those of the south of Paraguay, and the Yerba of Chiriguélo is stated to be the best of all. From the difficulty of access to this remote Yerbal it has never been worked, and the Yerba of trade is chiefly derived from the districts of San Pedro and Rosario.

KEITH JOHNSTON.

Reviews.

THE INNER LIFE OF SYRIA, PALESTINE AND THE HOLY LAND.*

As the wife of the distinguished African traveller, Mrs. Richard Burton comes before the public with very strong credentials. But she does not require any propping or backing up, she shines with no borrowed light, and she is quite strong enough to stand her own ground. The book in which she has made her *début* is professedly a book of travels, and gives us *The Inner Life of Syria, Palestine, and the Holy Land*; but the memorable places she describes "pale their ineffectual fires" before the warm interest inspired by Mrs. Burton herself. Whatever she talks about, and she touches on a multitude of subjects, her own individuality is uppermost; but she is so unaffected, and heartfelt in manner that no one would accuse her of egotism. Whoever reads her animated and suggestive sketches, lighted up as they are with an inexhaustible supply of enthusiasm, will agree that as an authoress she is a distinctly welcome gain. She comes upon us like a fresh and stimulating breeze, and to be in her company is to be braced up by "a nipping and an eager air."

She was well fitted for the work of accompanying her husband to Syria and sharing his expeditions. She could ride for hours in the saddle, handle a revolver, endure privations and fatigue, take the command of a camp if necessary, tend the horses, and look calmly on sights and sounds that would send most women into hysterics. These accomplishments go hand in hand with the utmost refinement and the highest cultivation; and it is this strange mixture of forces, the gentle and the strong, that gives Mrs. Burton the power to hold her readers in subjection. She tells us that this is her first "independent publication." She had previously assisted Captain Burton in bringing out *Unexplored Syria*, a work perhaps more interesting to severe geographers than to the unlearned understanding, and she has now done her best to give an account "of the inner life of the Holy Land in general and of Damascus in particular." With all her gift for outspokenness she is obliged to regret that she cannot present things exactly as she saw them.

"In the present day the press has settled into a certain groove: the English reading public have drawn four lines which represent

* Often called Yerba-maté; the maté, however, is the gourd out of which the tea infusion is sipped, through a tube, with a punctured bulb at one end.

* *The Inner Life of Syria, Palestine, and the Holy Land*. By Mrs. Richard Burton. (London: King & Co., 1875.)

the height, length, breadth, and depth of what they will read, and who wants to be read, and to be welcomed, must write within those lines . . . Besides which, *noblesse oblige*. I have been received with open arms in the greatest intimacy, I have eaten bread and salt with all classes, I have been admitted to prayer in the mosque tribune, and to all the *vie intime*. I cannot put them under a microscope to make my book entertaining, but there is much that I can say and quite enough to give my readers a fair idea of Eastern life."

The first sight of Damascus is by no means captivating, and Mrs. Burton looked in vain for the renowned "hanging gardens." The safest thing seems to begin with a little aversion, and ardent attachment for the Holy City is sure to follow.—

"Viewed from a height, and in good weather, like Stamboul, its domes and minarets impose upon you; but driving in, cold and tired, the shaky trap heaving and pitching heavily through the thick mire and slush, the narrow streets nearly meeting at the top, filled with dirt and wild dogs, is, to speak mildly, not pleasant. The thoroughfares, indeed, are all so paved with awful stones, that if you walk they ruin your feet, and wear out a pair of boots a week; and if riding, you must think all the time whether your horse can possibly get over the next heap, or if he will slide, fall, and break your leg. The large slabs are like ice, and the small ones are like the pilgrims' peas of the old tale. With all this, although you may grow to love even the faults of Damascus, so that you would not have them otherwise, you do not appreciate the picturesque the first evening of your arrival."

Women who go to the East generally succumb to the climate, grow limp in mind, and lose all energy; but it would be difficult to imagine Mrs. Burton in any position that would quench her vitality or subdue her irrepressible brain. She was soon mistress of the situation, knew everybody and everything, and speedily became the recognized leader of the little mixed group that constitutes "society" in Damascus. When she went abroad she was accompanied by an escort of brilliantly dressed Kawwassas. At first she was vexed at the fuss, but she soon found out that pomp and ceremony have their uses in impressing the natives. "I learnt that my meekness was quite misplaced, and that it takes some time to know how to behave in a manner which will gain respect in the East, which is the very opposite of that in the West. What would be considered conciliatory, high-minded, delicate, and well-bred in certain cases, would here be only mistaken for cowardice, meanness, and half-wittedness." She gives us the benefit of her experience in the bazaars, tells us what to select, and how to bargain, holds forth on the use of divans—those simple and luxurious seats that it would be so easy to introduce into our houses—and instructs us in the making of coffee, "delicious, thick, and oily, with a sort of bubbly cream at the top." There has lately been a discussion on coffee and the correct art of serving it. Mrs. Burton could settle the matter at once. Besides cultivating the European residents, our Consul's wife had to receive the natives and to qualify herself in all the intricacies of Syrian etiquette. To avoid giving offence the utmost tact is necessary, besides an unlimited power of digesting stray cups of tea or coffee with every relay of visitors. Of course we have a chapter on harfms, and details of conversations with the ladies whose ideas are bounded by the polygamous circle. The poor caged birds were delighted with their visitor and her pleasant manners, but it must have been a little difficult for them to understand the gospel of marriage in which only one wife figures in a household.

Crossing over Mrs. Burton's threshold, we have an

interesting picture of her own domestic life on uneventful days:—

"My work consisted of looking after my house, servants, stables, and animals; of doing a little gardening, of helping my husband, reading, writing, and studying; trying to pick up a little Arabic, receiving visits and returning them, seeing and learning Damascus thoroughly, looking after the poor and sick of my village and its environs. There is also galloping over the mountains and plains, and shooting either on foot or horseback. The only time I ever felt lonely was in the long winter nights, for I don't like going to bed when the chickens roost, and companions were impossible; it was too dangerous after dark (in summer one can occasionally smoke a *narghileh* with the women at the water's side in a neighbour's garden). So I used to occupy myself with literature, and at first with music, which I grew to dislike. I often sat and listened to the stillness, and counted the only sounds—the last call to prayer on the minaret top, which was adjoining my study window, the howling of the wild dogs, the cries of the jackals in the burial ground on the mountain, the bubbling of the fountains, the hooting of the owls in the garden, the sighing of the wind in the mountain gorges, the groaning of a huge water-wheel in a neighbour's orchard. These sounds were occasionally broken by a free fight in the road below, to steal a mare or to wreak an old vendetta. Twice I have been called down to the door to take in some poor wretch and bind up his sabre cuts. These hubbubs are varied in the day-time by the whacks of sticks and the cries of pain from various wretched animals—dogs or what not—and the wrangling of women in the hammam or in the gardens."

Amid her studies and manifold occupations, Mrs. Burton found time to take a practical stand as the champion of dumb animals. She witnessed sights that made her blood boil, and on all sides she was met by a brutal display of neglect and cruelty. She resolved to put an end to such inhumanities, or at least to bring about a reform, and the people around her soon found she was in earnest. She had special qualifications for this civilizade. She practically understood the treatment of horses, and knew much better than her grooms what the poor creatures wanted, and she had an elective affinity for animals in general. Her pet plaything was a tamed panther, and she would even like to persuade us that the cry of jackals is musical! It appears that the world labours under a delusion about the devotion of Arabs to their horses. When they do condescend to take care of them it is for their money value, and not for any sentimental attachment. "If his own animal is in question he will do all he can for it, if it is another man's beast he will do 'less than nothing.'" Mrs. Burton showed her sagacity in her original and testing way of securing a good groom, a test that might be adopted at home.—

"I will teach you for a week or a fortnight, and I shall be in the stable five or six times a day. If I see that the horses neigh and rub their heads against you when you come near them, I shall know that you are a good boy. If I see that their ears go back, or that they lash out or move away from you when you come near them, I shall know that you worry them whilst you groom them. When they have been out half a day if they turn a hair I shall see whether you feed them properly, or whether you steal the corn. If they like you, you stay; if they dislike you, you go."

What Lady Burdett Coutts has done at home in rescuing animals from oppression, Mrs. Burton has done in Syria. Night and day she looked after the animals, and brought everybody to book who ill-treated them. Her chivalrous ardour was well repaid, and for miles around she succeeded in establishing a reign of kindness. It was one long war against ignorance and temper, and only a woman of strong will and prevailing personal influence could have come off victorious. Indeed her ascendancy over the

natives and her insight into their character is closely akin to the influence exercised by Lady Duff Gordon over the Arabs of Egypt.

Damascus and its life represents one part of Mrs. Burton's book, and then we follow her on a desert trip—dressed as a boy, and passing for Captain Burton's son—to Palmyra. Later on she made a pilgrimage to Jerusalem and the Holy Places, and it is in this section that we get the best idea of her attainments, of the strength of her enthusiasms, and of her great capabilities as a traveller. Every page shows how widely she has read, how deeply she feels, and although fully aware of the trodden nature of the ground, she still contrives to give to her narrative all the force of freshness and originality. In theology, as in everything else, she wears her heart upon her sleeve, and speaks out fully. She is an "Old Catholic" and she tells us so, and her description of the sacred sites is of course tinged by the warmth of her belief. She is perfectly liberal to those who differ from her, or as she puts it, "whose brains are formed for disbelief." She has no desire to disturb the faith of others, far less to convert. "I wish," she says, "to write freely upon religious subjects, and as I respect all other religions, I require the same respect for mine." With a mind absolutely free from doubts, and untouched by the corrosive action of modern scepticism, this child of the True Faith prostrated herself at various shrines, and the description of her felicity is fervid enough to warm the coldest outsiders. There can be no doubt of the genuineness of her devotion, and of the real joy it gave her to find herself on hallowed ground; to look up every legend and tradition, and credulously to identify the sites so dear to pilgrims. "Not being used to living on sacred ground, you want at first to kneel down at every step, and you feel hurt because the people are walking gaily along, singing as if nothing had happened there. But you forget that these men live here, and that they would be kneeling all day long if they revered every sacred spot as you a visitor are doing." By way of contrast perhaps some readers may here be reminded of "Eöthen," the full unquestioning trust of one writer and the critical misgivings of the other. Pilgrims to Jerusalem, and all the world is tending there now, should make a point of taking Mrs. Burton's book. They will find all the hard work done for them, all the authorities looked up, and if they are of the same way of thinking, the satisfaction will be complete. Anyhow, they will secure a most instructive, cultivated, and sympathetic companion.

We have already spoken of the curious mixture of qualities in Mrs. Burton's character, and how her own "inner life" has a power of attraction as great as that of the "inner life" of the country she describes. The contradictory elements, however, are sometimes so extreme as to provoke amazement. A staunch Catholic and aristocrat, she brims over with generous notions of liberty. She is shocked at shams, shocked at the artificial ways of society, and the "cab shafts of civilization," and at the same time she has an unreasonable horror of the prosperous working-man, and almost goes so far as to believe in the divine right of kings. If we wish to see the fanatical side of her mind we shall find it in a dream, which came to her one day when, worn out with fasting and fatigue, she lay down to rest in a cave at Jerusalem. A great deal has been said about this dream, and a great deal has been thought that has not been said. In the company of a

"Guardian Angel" Mrs. Burton is taken up to Heaven, where she obtains a sort of diploma to reform the world and redress its wrongs. On returning to earth she settles every public question, apportions the various thrones of Europe to sovereigns of her own choosing, visits the Pope, and has an interview with Queen Victoria. If Mrs. Burton would let it pass just for what a dream is worth it would stand simply as a curiosity; but she makes a great point of it, believes that her visions are prophetic and destined to be fulfilled. To ordinary people the phenomenon is easily explained. A nervous, impressionable woman, exhausted with fasting and attending church ceremonies, and a head full of politics, theology, and her husband's wrongs, falls asleep and naturally dreams of the things that have engrossed her. Mrs. Burton's admirers, who are so ready to follow her waking thoughts, can only feel astonished that any one so sagacious and capable, so brilliant and rational, could be a prey to superstition. Extremes meet, and while one portion of her brain represents the full blaze of civilization, another portion is steeped in mediæval barbarism! Other people less candid would have suppressed the dream, or given it for what it is worth; but our authoress is fearless and stands by it, and is willing to take the consequences.

It will be seen that Inner Life in Syria is full of the most varied interest, and the enthusiasms and vagaries of the writer add immensely to its charm. Mrs. Burton is truly a many-sided woman. All who read her first book will be anxious for a second, even although it should be adulterated with another dream!

VERRAZZANO.*

THE Italian Giovanni da Verrazzano has hitherto had the credit of having discovered the greater part of the coast of the United States, from South Carolina to 50° N. American historians and compilers of narratives of voyages and travels have been puzzled at the description of the route, but they have accepted the authenticity of the expedition without question. The account of it first appeared in excellent company, in the well-known collection of Ramusio (vol. iii. p. 420), and it has since been constantly referred to and described as an important voyage of discovery.

Mr. Henry C. Murphy now pronounces the alleged discoveries of Verrazzano to be utterly fictitious, and transfers their credit to the Spanish voyage led by Estevan Gomez. This is undoubtedly an important and very interesting question, and Mr. Murphy has brought so much learning to bear upon it, he has stated his case so clearly, and has argued each point with such logical precision, that his conclusions will, we think, be very generally accepted by historical students and comparative geographers.

The account of the voyage first appeared in 1556, in Ramusio, in a letter, purporting to be from Verrazzano himself to the King of France, who is said to have despatched the discovery ship. There is also a manuscript copy of the letter, forming an

* *The Voyage of Verrazzano*: a Chapter in the Early History of Maritime Discovery in America, by Henry C. Murphy. (New York, 1875.)

enclosure to a letter from one Fernando Carli at Lyons to his father at Florence, preserved in the Magliabechian library of that city. The letter of Verrazzano is dated from Dieppe on July 8th, 1524, that of Carli, sending it from Lyons to Florence, on August 14th, or 37 days afterwards. Mr. Murphy considers that these dates prove the Verrazzano letter to be fictitious. The pretended discoverer's letter would have been sent to Francis I. at a time when he was marching to Lyons on his way to oppose an invasion of Provence by the Emperor's army, but before he had reached that city, and consequently Mr. Murphy argues that it could not have been in Carli's possession in Lyons, at the alleged date. Moreover, there is in France no record of or allusion to any such voyage ever having been fitted out by Francis I. previous to the publication of Ramusio; and, if such a voyage had been despatched, it is morally impossible that it should not have been noticed. The same king sent out Cartier in 1534 and 1541, but on these occasions no allusion is made to Verrazzano, and in the mappemonde constructed for Francis I., in 1543, the line of coast is taken from the Spanish maps, as well as the names, and no use whatever is made of the alleged discoveries of Verrazzano. These discoveries are asserted to have been made for the French Government, yet it is clear that, during the next twenty years, no French official or writer had ever heard of them. Then again the statements in the Verrazzano letter are inconsistent with actual exploration. Mr. Murphy gives reasons for the conclusion that the claim for Verrazzano was not set up before 1529, a date subsequent to the coast of North America having been discovered by another explorer.

The letter in Ramusio is pronounced to be an attempt, by an Italian, to appropriate for one of his countrymen the glory which really belongs to a Portuguese pilot in the service of Charles V. Estevan Gomez, a native of Oporto, entered the Spanish service, went out as chief pilot in Magellan's voyage, but deserted and returned to Cadiz in 1521. The coast of North America was then unknown from South Carolina to Newfoundland, and Gomez was sent to make discoveries in that direction. He sailed from Coruña in February 1525, reached the coast of what was afterwards called Carolina, entered the mouths of the rivers Chesapeake, Delaware, Hudson, and Penobscot, and returned home with some captured natives. In short, he made the exact voyage which is attributed to Verrazzano. Now there can be no question as to the authenticity of the voyage of Gomez. It is established on the authority of Oviedo and Peter Martyr, who actually saw the Indians brought home by the explorer. The account of the voyage was published immediately afterwards, in 1527, with a map.

Mr. Murphy's conclusion is that the voyage of Verrazzano is entirely fictitious, and that the letter describing it was concocted after the publication of the account of the discovery by Gomez, in order to transfer the glory of it to a citizen of Florence. This is not the only instance of a literary fraud which has long been successful; but, sooner or later, the truth almost always prevails. Yet there really was such a mariner as Giovanni Verrazzano. He was a native of Florence, who became a piratical leader in the French

service, and, at the very time of the alleged voyage, he was employed in another part of the world. He was eventually captured by the Spaniards, and executed in 1527. There is, however, no reason for supposing that Verrazzano himself was in any way accessory to the imposture.

FOUR THOUSAND MILES OF AFRICAN TRAVEL.*

THE renewed activity which of late years has been displayed in the attempt to suppress the slave-trade on the western and eastern coasts of Africa, has had the effect of concentrating the traffic on the land routes from the region of the Upper Nile towards the Red Sea. The want of a better knowledge of the extent of the trade and of the chief routes taken by the slave merchants is greatly felt. The volume now before us from the pen of the Secretary to the American Geographical Society is in great measure designed to supply this want, and it is particularly welcome at a time when a chance has served to kindle a fierce anti-slavery agitation throughout the country, and to show the need of exact information on the present state of the traffic.

The line of route along which the reader is taken lies for the greater part up the Nile, the lower course of which is tolerably familiar to readers of African travel, but the upper portion of which, on the contrary, few care to visit. Mr. Southworth (who travelled on behalf of the *New York Herald*) had first intended to make his way as far south as the head-quarters of Sir Samuel Baker, whose position was at that time critical. But the season proved to be unsuited for so formidable a task, and the expense likewise promised to be so considerable, that Mr. Southworth had to content himself with penetrating as far as between 11° and 12° N. latitude; that is, not quite halfway between Khartoum and Gondokoro.

At Khartoum, which is a converging point of many of the slave caravan routes, the author stayed for five months, and this afforded him a good opportunity for acquiring information. Though slavery is indeed legally dead, voluntary slavery still exists, and until the Koran is amended, and the religion of the Ottoman empire changed, perfect freedom is unattainable. It is characteristic of the usual class of anti-slavery speeches that they shirk this difficulty, one which, however, Mr. Southworth fully acknowledges. But there is nevertheless much cruel work which goes on which ought to be suppressed. To endeavour to reduce this to the form of statistics is of course a very perplexing task, but from many sources the author inclines to think that the export of slaves from the country lying between the Red Sea and the Great Desert is 25,000 annually, a number which, however, represents only a fraction of those who die before reaching the places of export. The vigorous efforts of Sir Samuel Baker to crush this traffic receive, we are glad to see, deserved approbation in this book, and confident hopes are entertained of the success of his illustrious successor, Colonel Gordon.

* *Four Thousand Miles of African Travel.* By Alvan S. Southworth, Secretary of the American Geographical Society. (New York, Baker, Pratt & Co.; London, Sampson, Low & Co., 1875).

In these days, when the direct pecuniary advantage to be derived from every project or expedition is so keenly discussed, more especially in England, it is very satisfactory to find that the discovery of the sources of the Nile has an acknowledged practical importance in the eyes of the ruler of the country. This was evinced in the course of a most interesting interview with the Khedive, which Mr. Southworth was fortunate enough to obtain. Mr. Southworth enlarges upon the topic in another chapter, and remarks that as those sources are the reservoirs whence flow the waters giving vitality to over thirty millions of people, without which Egypt would be an arid waste, and as the fickle inundations of the Nile are fraught with the most vital interests, it is highly important to acquire a knowledge of the laws which regulate its supply of water.

A very interesting chapter is an early one devoted to a general consideration of the position and prosperity of Modern Egypt, the capabilities of which, as regards sugar and cotton cultivation, are clearly enormous. Its financial position is, as every one is aware, considered by recognized authorities to be open to question, but there is no contesting the broad facts that since 1863 the country has emerged from an ignoble obscurity in which it was oppressed by crushing taxation, and thanks to the energy and patriotism of its most capable ruler, has achieved a position which may well cause envy and uneasiness at Constantinople. Mr. Southworth conveys a very interesting notion of the character of the Viceroy as well as those of some of his ministers with whom he held conversations, by circumstantial descriptions of the interviews.

To those who seek in works of travel something lighter than discussions on the political economy, geography, or history of a country, the present book will not cause disappointment, for besides giving a picturesque idea of Nile travelling, it abounds, especially in the earlier parts, with that quaint American humour which we have so relished in the pages of the *Biglow Papers* and *Artemus Ward*. A good specimen will be found in a description of the heterogeneous doses issued to feigning invalids among the native crew of the 'Dahabeah,' p. 67. The illustrations in the book appear to be reproduced by lithography from photographs, and both on account of the judicious selection of subjects (these being principally "types" of the population) and the capital execution, deserve mention. We much trust Mr. Southworth may have occasion at some future time to favour us with another as fresh and interesting a narrative of his travels.

THE INDIAN FORESTER.*

WE heartily welcome the appearance of the first number of the *Indian Forester*, edited by Mr. Schlich, the Conservator of Forests in Bengal, and published in Calcutta in July 1875. This excellent periodical will be the organ of the Indian Forest Department; and is intended to supply a medium for the interchange of ideas among Forest Officers, and for the record of

* The *Indian Forester*, a Quarterly Magazine of Forestry, edited by W. Schlich, Ph.D., July, 1875. (Calcutta).

observations and experiments. "Free, full, and unfettered discussion," says the editor, "is the very life of forest science and forest art."

The first number contains several valuable articles. The "Remarks on the Sunderbuns," by the editor, furnish some account of the low islands forming the delta of the Ganges, which supply Calcutta and several districts of Bengal, with timber, fuel, and thatching-grass. Mr. Schlich describes the process by which the Sunderbuns have been formed, their vegetation, and their yield of forest materials. The next article is on "Coomrie Cultivation," by Mr. J. L. Laird; and then follows a paper on the means of obtaining length of stem for timber, by Mr. A. Pengelly, a son of the eminent geologist, at Torquay. Mr. Baden Powell contributes a very interesting note on the Dehra Dún forests, which is followed by reports on the Mysore sandal-wood, and on the African gum-copal tree. The number also comprises reviews of books on forestry, notes and queries, and a section on *shikar* and travel.

We trust that the *Indian Forester* will have a long and useful career. The great difficulty for such undertakings, in India, is to obtain contributions with regularity and in sufficient number. But, judging from this good beginning, we believe that the editor will overcome the obstacles that surround the first launching of a venture of this kind; and that the *Indian Forester* will continue to receive the encouragement it so well deserves.

Cartography.

Educational Maps and Models at the Paris Exhibition.

THE number of maps exhibited during the Geographical Congress at Paris was exceedingly large, and the task of a reviewer was rendered additionally difficult as all maps offered for exhibition, whether good, bad, or indifferent, had been accepted indiscriminately, and were arranged by countries and not according to subjects. Several maps, which we now know to have been there, escaped our notice simply because they had been placed in some obscure corner or were hidden away in a portfolio. Others we were not in a position to examine with sufficient minuteness to enable us to pass an opinion upon them. For these reasons the present notice is necessarily incomplete, even as far as the Paris Exhibition is concerned, and it is so still more with reference to school maps generally, for many of the best amongst them were conspicuous at Paris by their absence only.

To begin with wall-maps, as one of the most indispensable articles of furniture in a school-room, it is satisfactory to be able to state that in their preparation more attention is being paid now to the physical features of the earth than used to be the case formerly. Sydow's wall-maps, the publication of which marks an epoch in the history of cartography, were exhibited, strange to say, in the Russian Department. O. Delitsch's orographical maps, which are printed on oil-cloth, without names, which can thus be inserted by a pupil undergoing examination, deserve a word of notice. They are accompanied by an elementary atlas of identical contents. Kiepert's physical wall-maps are amongst the best published, and have already been noticed in our pages. They combine tints for mass-elevations with shaded hills, which strikes us as being preferable to tinted contour

maps, such as have been prepared by Messrs. Streffleur and Steinhäuser of Vienna. Speaking of hypsographical maps, we feel bound to mention a map of France prepared at the *Dépôt of Fortifications*, and remarkable not so much on account of its novelty, but for the taste with which it is tinted. The lowlands are left white, and then follow four yellow tints, four green, and four brown tints. The glaciers are coloured blue. There were of course a number of school maps having the hills shaded in the usual style. Amongst these may be mentioned M. Wagner's map of Germany and Ziegler's map of Switzerland. The Swedish maps, by A. von Mentzen, have the hills shaded in black or brown, and the plains tinted yellow or green. They are very effective, but rather coarse. This, too, is the place for a passing notice of the maps prepared at Cavael's Photo-lithographic Institute at Weimar. They are photographed from models prepared by Mr. Raaz, and where the features of the ground are favourable to an oblique light, they convey a capital notion of the features of the ground—as witness a map of the Caucasus in the Russian Department. By tinting the plains, which has been done in several instances, the hills are brought out with still greater effect. In producing maps of this kind it is essential that the model should be correct. Unfortunately this is not always the case in the present instance. Reduced copies of these maps have been published in the shape of an "Oro-hydrographical School Atlas," and by procuring a copy of this, our readers, without going to the expense of purchasing the large maps, will be able to form an opinion as regards the universal applicability of this method to the production of maps. We feel certain that their verdict will not be favourable. Amongst French maps, those produced under the direction of M. Levasseur, one of the most ardent advocates for the introduction of geography into French schools, are deserving of favourable notice.

Merely as a curiosity we mention a map of France prepared by order of the Minister of Education. There are no names upon it, but each town, river or mountain is provided with a hook, to which the pupil is expected to attach a small tablet bearing the corresponding name. This arrangement strikes us as being very cumbersome. Delitsch's oil-cloth maps are far preferable for purposes of examination, and an excellent substitute for blank paper maps is supplied by Messrs. de Lorne and Plazanet (Hachette and Co.), who print their outline maps on enamelled metal, upon which names or other features may be inserted in pencil, and then obliterated. We fancy that these tablets might prove useful in a school. Their original cost is higher, no doubt, than that of paper maps, but in the long run they will certainly prove the cheapest.

There can be no doubt that one of the readiest means of conveying a notion of certain topographical or geographical features is afforded by models or pictures. Stereoscopic views or similar illustrations cannot therefore be recommended too strongly for the use of schools. A set of such, judiciously selected, and sold at a reasonable rate, ought certainly to find purchasers, not amongst the directors of schools only, but amongst the general public likewise. We saw several sets of illustrations at the Exhibition, but none sufficiently comprehensive to recommend itself for school use. In the Russian Department, which was particularly rich in educational appliances, we found likewise a set of lay figures, dressed up to represent different races, care being taken to render their features characteristic. If models of houses, of weapons and various utensils be added to these, a sort of Doll's Ethnological Museum might be produced at comparatively small expense, which would afford both amusement and instruction to the pupils.

Relief maps call for more than a passing notice, for their utility for school use is undoubted. They are superior to ordinary maps when it is desired to impart some knowledge of geographical nomenclature or of the most striking physical features. Attempts have been

made, at various times, to combine within the compass of a small model, every topographical feature, from the snow-clad Alps down to the dunes along the sea-shore. These fancy models, however, deserve no encouragement. They not only fail to illustrate what their authors propose, but really propagate error, as features so various are never met with in such close proximity. It is far preferable to procure a few characteristic models on a scale sufficiently large to convey an accurate idea of certain physical features, and to give an insight into the structure of mountain regions, such as can certainly not be obtained from an ordinary map, in spite of the most elaborate and skilful hill-drawing. Above all, each school should be furnished with a relief map of the country within which it is situated. A model of that sort would enable the pupils to compare the objects in nature with those on the relief, and if a good topographical map be suspended over it, the master will be in a position to give practical lessons in the "reading of maps." This is a subject very much neglected, we are afraid, and this neglect naturally prevents really good maps from meeting that encouragement on the part of the general public which alone will render their production a profitable enterprise by enabling them to compete successfully with the trash which now swamps the market. Fortunately there is no lack of good models on a large scale, suited to educational requirements, whilst one of the environs of a school can easily be prepared from a good topographical map, such as the new sheets of the Ordnance Survey.

The large-scale models which we saw at Paris, and a few of which we shall mention, may be brought into two classes, according to the system on which they have been prepared. The first of these classes includes models made as near as possible in imitation of nature, and either coloured in a style more or less conventional, or not coloured at all. Amongst this class we may mention G. C. Winckler's beautiful model of the Bavarian Alps; a model of the Gulf of Cattaro, which shows likewise the configuration of the sea-bottom; Bardin's model of the Grande Chartreuse, Chambéry and Grénoble (1:40,000); A. Girard's environs of Grénoble (1:80,000); Maillard's Réunion, and Captain Pistoia's elaborate model of the Etna. The latter is in copper, a material not at all favourable on account of its dark colour, which does not afford light and shade, as is the case with plaster of Paris.

The second class of these models is built up from contoured maps, a method first introduced by the Austrians, we believe. On these models the country rises in steps, which is certainly not true to nature, and we feel bound therefore to warn against their multiplication, in spite of the facility with which they can be manufactured with the aid of a contoured map, a pair of scissors, and a few sheets of paste-board. If it appears desirable to introduce contours on a model, they ought to be indicated merely by lines or scratches, as is done on Bardin's model of the environs of Metz. Amongst representative models of this kind we may mention that of the region of the "Cirques," or amphitheatres in the Pyrenees, which is done in plaster, and those of the St. Gotthard and of the environs of Berne, which are produced from the Federal map of Switzerland. A fearful exaggeration of this style was exhibited by Baron Schluga-Rastenfeld, whose relief of France is a preposterous caricature of the truth.

We now come to relief maps on a smaller scale. These have been objected to on account of their conveying false notions with reference to the features of the ground. This objection we hold to be utterly groundless. It certainly is necessary to generalize in the case of these reliefs, and to exaggerate certain features at the expense of others of less importance. But the same thing has to be done in the case of ordinary maps; and as long as it is done judiciously, and as long as the features of the ground are represented characteristically, no objection will be

valid in the case of relief-maps which does not apply with equal force to reduced maps drawn on a plain surface. An inspection of the relief-map of France, produced by Mdlle. Kleinhans, under the direction of M. Levasseur, is amply sufficient to refute these and all other objections. It certainly is one of the best maps of that class which we have seen. The colouring is exceedingly tasteful, but its chief merit consists in the accuracy and faithfulness with which the various features characterising the surface of France and the neighbouring countries have been rendered. The information conveyed by this relief is certainly not to be obtained from ordinary maps, though these, as a matter of course, possess advantages of their own. The contrast between Mdlle. Kleinhans's work and a relief of France by M. Sanis, on about the same scale, is exceedingly striking. It proves clearly that mechanical skill alone is not capable of producing a relief any more than an ordinary map, and that in order to enable the modeller to generalize orographical features with success, his hand must be guided by knowledge and intelligence. Many other models on a small scale were exhibited, but only few of them call for notice. M. J. Bauerkeller's relief maps in blue and grey, are not only incorrect but very ugly into the bargain. M. Drivet has exhibited a series of relief maps embossed in paper, side by side with the original plaster casts, and whilst the latter leave nothing to be desired as regards sharpness, the former appear blunted, and none of the beauty of the originals can be traced in them. In fact, we have not hitherto seen any paper reliefs on a *small* scale which could be said to give satisfaction, and this is all the more to be regretted, as plaster or metal are not only cumbersome, but require to be coloured by hand, which considerably adds to the cost.

A few more educational appliances may be mentioned. M. B. de Chancourtois exhibited a very useful set of models and diagrams illustrating the most usual projections of the globe. There were of course numerous globes, besides armillary spheres and apparatus demonstrating the phases of the moon or the changes of the seasons, but none of these appeared to us to call for particular notice.

In conclusion we might say something about "geographical games," several of which came under our notice. A desire to teach our youth whilst at their play, which we fear will not be cheerfully responded to by those whom it is intended to benefit, found expression in a game entitled "L'Europe amusante; Jeu de Drapeaux." The amusement merely consists in this, that the players place the various national flags upon a map of Europe. Those who commit an error pay a forfeit, and unless some fun is got out of the redemption of the latter, we fear this "game" will prove rather dull.

E. G. RAVENSTEIN.

MEMORANDUM ON THE CENSUS OF INDIA of 1871-72.

By H. Waterfield (Presented to Parliament 1875).

IN 1871-72 an attempt was made to take a general census of India at a given date, for the first time, but it was incomplete owing to the Punjab, Oudh, and Berar being omitted, as well as the Native States. Great credit is due to the gentlemen who arranged and superintended the difficult Census operations, and the names of Mr. Beverley in Bengal, Mr. W. Chicheley Plowden in the North-West Provinces, Mr. Neill in the Central Provinces, and the late Mr. Gover (author of "Tamil Folk Lore") in Madras deserve special mention. An account of their proceedings and of the results in connection with the Census, will be found in the Section on the Condition of the People, in the *Statement of the Moral and Material Progress of India for 1872-73* (p. 121). Mr. Waterfield's memorandum also brings into one view the available particulars relating to the population of British India, in a series of 33 tabular statements with explanatory notes. It will be found useful for reference.

Log Book.

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Lieutenant Egerton.—We announce, with great pleasure, the promotion of one of our Arctic explorers, now wintering in the far north. Mr. George LeClerc Egerton went out as sub-lieutenant of the 'Alert,' and at Godhavn he also undertook the important duties of paymaster. He was promoted to the rank of lieutenant on October 15th, and has been duly appointed as a lieutenant to H.M.S. 'Alert.'

The Whaling Fleet.—News has been received of the whalers, and we trust that they will all have arrived safely at Dundee before this number of the *Geographical Magazine* is in the hands of our readers. On October 12th, a letter was received, by a Danish brig, from the 'Active,' commanded by Captain Fairweather, dated at Holsteinborg, on the 21st of August. On the 22nd of June the 'Active' broke the fan of her propeller in the ice of Melville Bay. She, however, prosecuted her fishing in Prince Regent's Inlet, up to the 1st of August, when she proceeded to Holsteinborg to refit. She arrived in that port only a few days after the departure of H.M.S. 'Valorous,' and sailed to complete her fishing on the west side of Davis Strait on August 21st.

On the 19th of October a letter was received from Captain Deuchars of the whaler 'Jan Mayen,' dated on September 29th, off Cape Kater. The letter was brought home by the Norwegian whaler 'Harold Haarfager' which reached Stromness on October the 17th. Captain Deuchars reports that the fleet reached the south-west ice on the 30th of May, the "North Water" of Baffin's Bay on the 22nd of June, and Prince Regent's Inlet on the 28th of June. Owing to the northerly winds the land ice was broken up on the 14th of July, causing the fishing there to be almost a complete failure. The 'Jan Mayen' left Prince Regent's Inlet on the 10th of July, to proceed to the middle ice, and Captain Deuchars expected to be able to remain in Davis Strait until very late, as there was no ice on the coast. There had been very few whales seen, owing to the ice being very light, and a scarcity of food in the water. In fact last year more whales were seen in one day than during all this season. The whole fleet was spoken by the 'Harold Haarfager' between the 26th and 30th of September, and the following list gives the catches of each ship up to those dates:—

	Fish.	Tons.
'Arctic' (Captain Adams)	3	45
'Active' (Captain Fairweather)	14	95
'Nova Zembla' (Captain Loffleys).....	7	50
'Erik' (Captain Walker)	5	50
'Polynia' (Captain Kilgour)	8	50
'Jan Mayen' (Captain Deuchars)	5	35
'Esquimaux' (Captain Yule)	4	20
'Ravensraig' (Captain Bannerman)	2	25
'Victor' (Captain Nicoll)	5	20
'Camperdown' (Captain Gravill) ...	3	20
'Narwhal' (Captain McLennan)	4	20
'Intrepid' (Captain Soutter)	1	20
'Mazanthen'	2	10
'Harold' Haarfager } Norwegian {	0	60
'Grönland'	0	clean

The Swedish Arctic Expedition.—The expedition under Professor Nordenskiöld left Tromsø on the 8th June, and arrived at Novaya Zemlya on the 22nd. For some weeks they occupied themselves in making zoological, geological, and botanical researches. After being foiled, by the ice, in their endeavour to get through the Matochkin Shar, they sailed southward, and succeeded in passing through the Yugorsky Shar (the straits between Vaigats Island and the mainland of Northern Russia) into the Sea of Kara, which they found to be free from ice. They then sailed for the centre of the Yalmal peninsula, and the wind being light they were enabled to dredge, and make temperature observations; which tended to prove that no warm under-current exists in the Kara Sea. After penetrating as far as $75^{\circ} 30'$ N. latitude, they made for the Yenisei, which the Professor and his friends ascended by boat as high as Dudinka village, having on the 15th August sent back the "Pröven" to Norway, where she has since safely arrived. Professor Nordenskiöld has since made his way to Tomsk in Siberia. He reports that he discovered a splendid harbour at North-east Island, that he found the mouths of the Obi and Yenisei quite free from ice, and though shallow he anticipates that the success of this expedition will result in the establishment of trade between Europe and Siberia, and enable the rich products of the latter country to find an outlet along her great rivers. Our readers may remember that Captain Wiggins endeavoured to accomplish the same feat last year.

The Victoria Nyanza.—The expedition sent out by the *Daily Telegraph* to explore the lake region of Equatorial Africa, under the command of Mr. Stanley, has achieved a great success. The explorer has marched over a new route from Ugogo to the shores of the Victoria Nyanza, has launched a boat on its waters, and has circumnavigated the lake, thus ascertaining its form and dimensions. Mr. Stanley left the usual road from the coast to Unyanyembe at Upwapwa, and reached the western frontier of Ugogo on the last day of 1874. He then struck direct north across an almost level plain, and, after several days of severe marching, most of the party were unable to move from hunger and fatigue. At Chiwyu, in the Urimi country, Edward Pocock, one of Mr. Stanley's English companions, died of fever, and several of his native followers had sunk from exhaustion on the road. At this place, in about the latitude of Ujiji, the waters begin to flow north; and Mr. Stanley discovered a river called on different parts of its course the Liwumbu, Monangah, and Shemeeyu, which empties itself into the Victoria Nyanza after a course of 350 miles. He followed the river, passing through the Usukuma country discovered by Speke, whose route was parallel to and a little to the west of that taken by Stanley. In one part of the valley of the Liwumbu there was a collision between Stanley's party and the inhabitants of Ituru. When hostilities commenced, Stanley sent four parties from his camp in different directions, to seize upon all grain and cattle, and to burn every village they came to. The number of inhabitants killed was 45, and Mr. Stanley lost 21 men. He left the coast with 300 men, and, after this conflict there were 194 left. He had lost 120 from fatigue, fighting, and want of food.

In March the expedition reached Kagehyi, a port on the Victoria Nyanza, a few miles east of Muanza, the place first reached by Speke. By this time 28 more men had died, and 166 survived. Mr. Stanley put the boat together which he had conveyed from the coast in pieces, and, launching it on the lake, commenced his voyage of circumnavigation. Passing the islands of Ukerewe and Ukara, and Mazita, which Speke believed to be an island but which proves to be a mountain on the mainland, the explorer proceeded up the eastern side of the lake. His descriptions of the scenery, and of the character of the surrounding country, are extremely interesting. He reached the capital of Mtesa, and met there Colonel Linant de Bellefonds of Colonel Gordon's staff, through whom he forwarded a letter which has not yet been received. A telegram has since announced the death of M. Linant de Bellefonds in the Unyoro country, on his way back. The King of Uganda agreed to lend Mr. Stanley 30 canoes to convey his party across the lake to the western shore at the mouth of the Katonga River, and on April 17th Mr. Stanley left Murchison Bay, returning to his camp on the south side of the lake on the 4th of May, after an absence of 58 days. In the interval Frederick Barker, another of his English companions, and several African followers, had died.

Mr. Stanley's two letters, dated at Kagehyi on the 1st of March and 15th of May, came by way of Zanzibar, and were published in the *Daily Telegraph* on the 15th and 18th of October. His sketch map of the Victoria Nyanza has been placed in the hands of the President of the Royal Geographical Society. Mr. Stanley has proved himself to be a most resolute and determined explorer; and we very heartily congratulate his liberal employers on the great success he has achieved.

An evening will be devoted to the consideration of Mr. Stanley's discoveries at a meeting of the Royal Geographical Society, in November. Meanwhile, we publish a letter from Captain Burton, containing that eminent traveller's remarks and criticisms on Mr. Stanley's letters.

Mr. Major's Voyages of the Zeni.—In an important Italian work published this year in Rome, under the title of "Bibliographical and Biographical Studies on the History of Geography in Italy," by Signor Cesare Correnti, President of the Italian Geographical Society, we notice the following remarkable passage on Mr. Major's edition of the Zenonarrative:—"But, however solidly the authenticity of the voyages and of the narrative of the Zenos may be established, there still remain some obscure points with reference to which critical studies, which might lead to more satisfactory explanations, would not be useless; I quote for example the localization of the island Icaria which Forster, and now Major, will establish in the Kerry Islands, a conjecture which does not seem to me exactly to agree with the narrative of Antonio Zenos."

Where the "Kerry Islands" may be we are at a loss to guess; and therefore cannot say how far they may or may not be in harmony with the Zenos narrative; but in justice to Mr. Major we must say that neither Forster nor he has made any reference whatever to such imaginary islands. A century ago Johan Reinhold Forster

first suggested that the name of Icaria took its origin from Kerry in Ireland, but adduced no arguments from the narrative to confirm his suggestion. Mr. Major has, however, deduced abundant arguments to prove that Forster was right, which are not only in harmony with the Zeno narrative, but derived therefrom. The name, the point of arrival on the west side of the island, the conduct of the natives, who made signals by fire and smoke, the pursuit along the hill-tops and the howling of the strangers off the coast, and the movements of the fleet after leaving the island, all lead to the same conclusion. Indeed of the many puzzles in the Zeno narrative of which Mr. Major has supplied the solution, this of Icaria was perhaps the most difficult, and we cannot but congratulate Mr. Major on the success of his explanation. But after he has conquered such a difficulty, it is somewhat hard that the very essence of his explanation should be misstated, and that the misstatement should be made a ground for demanding further critical studies in order to render his labours on a subject which he has really effectually conquered, more complete and satisfactory. It is to be hoped that if Signor Correnti's work reaches a second edition, this remarkable mistake will be corrected.

Introduction of Casuarina trees into Aden.
—Mr. Gerald Raoul Perry, H. M. Consul at Réunion, during a useful public career in the navy and in the consular service, has been distinguished for the zeal he has always shown in furthering useful projects in the interests of his country. When he stopped at Aden, on his way to Réunion last year, he was struck by the absence of all vegetation, and by the utter desolation of the place. On reaching Réunion he noticed the strength and hardihood of the *filao* trees (*Casuarina laterifolia*), and the idea occurred to him that they were peculiarly adapted to the arid soil of Aden, and that their introduction into that place might possibly be effected with success. Mr. Perry has now forwarded to H. M. Political Agent at Aden a case containing from 1000 to 1045 young Casuarina trees, and a good supply of seeds, with full instructions for sowing and treatment.

N. Mikluko-Maclai on the Malay Peninsula.—The object of M. Maclai's journey to the Malay Peninsula consisted in ascertaining whether there existed any traces of a Papuan population. He considered our present information on that point to be contradictory, though Crawfurd and Logan spoke of negro tribes living in the interior. There could be no doubt that the Sémangs were not Malays, though Newbold (*Political and Statistical Account of the British Settlements in the Straits of Malacca*, 1839, p. 377) identified them with the Yakung, who, in his opinion, are Malays.

M. Maclai took up his residence with the Sultan of Johore, who exhibited much interest in his guest's investigations, and promised to assist him as far as lay in his power. The commissariat of the carriers turned out to be the greatest difficulty, and as they live on rice, which is not found in the woods, it was impossible that each man should carry provisions to last for twenty days, the proposed duration of the excursion. The Maharaja strongly advised not to

employ Orang-utang carriers, instead of Malays, as they were quite likely to abandon him in the woods on the smallest provocation. M. Maclai therefore started without any definite plan, his only object being to come into contact with the inhabitants of the woods and hills, which are known in Johore indifferently as Orang-utang (wood-men), Orang-buket (hill-men), Orang-liar (wild-men), Orang-raiyet (aborigines), or Orang-yakung, "a name of unknown origin and meaning," according to Crawfurd.

On the 2nd February, 1875, M. Maclai returned to Johore, after an absence of seven weeks. The results obtained by him were important though not final. The journey was exceedingly fatiguing. It had been begun before the termination of the rainy season, and the water sometimes reached to his waist. It took him thirty days to cross Johore from west to east, from the mouth of the Muar to that of the Indau, although a great portion of the journey was performed by boat. The dense forests, which frequently necessitated cutting a path; the swamps; the numerous rivers, which had to be crossed by bridges or ferries of his own construction; the necessity of building huts for the night's rest (for there were hardly any inhabitants), all caused much delay. From Indau M. Maclai returned to Johore-Baru by land, which took twenty days. In the course of his journeyings he frequently met Orang-raiyet and Orang-utang, and had an opportunity of entering into relations with this primitive people, who are doomed to extinction, for Chinese and Malay settlers are pushing into the interior, and as the Orang-utang show no inclination to alter their mode of life, they will either disappear altogether, or be absorbed by the Malays.

M. Maclai feels convinced that the Orang-utang of Johore, though by no means a pure race, exhibit traces of a mixture with some other race, non-Malay, and probably Papuan.—*Istv. Russ. Geo. Soc.* xi, Part 2.

The Longitude of Teheran.—Colonel Stebnitzki determined the longitude and latitude of Teheran whilst employed there in observing the transit of Venus. The latter was determined from observations of stars, the former by means of the telegraph, the point of comparison being Erivan, the longitude of which is known accurately from the Caucasian trigonometrical survey. The results are as follows:—

	Latitude.	Longitude E. of Greenwich.
Russian Embassy.....	35° 40' 50" 81	3h. 25m. 40s. 61
Indo-European Telegraph Station	35° 41' 6" 83	3h. 25m. 43s. 46

} 51° 25' 5"

The altitude was determined by means of thirty-seven barometrical observations. Corresponding observations were made at Erivan and at Baku, and the altitude deduced from them are 3740 feet, and 3663 feet above the Black Sea respectively, the mean being 3702 feet.—*Istv. Russ. Geogr. Society*, xi, Part 3.

New Trade Route between the Aral Sea and the Caspian Ports.—Some of the Russian papers mention that a certain mercantile firm proposes to explore the region between the Aral and the Caspian with the object of establishing a caravan route for the transport of fish, prepared on the shores of the former and exported across the Ust-Urt and the Mertvi Kulduk Bay to ports on the Caspian.

Correspondence.

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MR. STANLEY AND THE VICTORIA NYANZA.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I heartily congratulate the *Daily Telegraph* upon the choice of its gallant commissioner, and I only hope that the latter may succeed in carrying out the grand exploration which he has so worthily begun.

Nevertheless, it is my duty to warn your readers, as I did nearly three years ago, against accepting, without the gravest consideration, the statements put forward by Mr. Henry M. Stanley in the *Daily Telegraph* (Oct. 15th and 18th, 1875). The letters are evidently written in haste, and after much weariness of mind and body; and mature reflection combined with further experience, may introduce important modifications into the more permanent record of travel.

At length after ten years we are stripping the garb of fable from the Victoria Nyanza. I will not write the word Nyanza or Neeyanza, because the latter forms are hardly in accordance with the rule of the great South-African families of language, and because Mr. Stanley, although strong in the vernacular, proved in his first work (*How I Found Livingstone*) that he ignored the minutæ of the speech, and that his ear must not be relied upon.* Far more competent scholars, Messrs. Wakefield and New, prefer to write the word Nyánja, even as Mr. Stanley would convert Mazita, into Majita. It is the same with "Mkali" for "Mk'hali;" nor must we accept "Ituru" until we are enabled to decide whether it is the "Utaturu" of Captain Speke's first map, a name which afterwards unaccountably disappeared from the charts. We must hear more before we adopt the "mangroves" twice mentioned as growing in sweet water; and, a far more important point, we cannot for a moment admit the dictum, "I am sorry to say that, if I am right, Speke is about fourteen miles wrong in his latitude along the whole coast of Uganda." My late companion's observations have been carefully checked by the highest possible authority, Lieutenant Cameron, R.N., and the gallant young officer found them generally right within a mile. In the same paragraph Mr. Stanley seems not only to trust in aneroids, but also to think that the longitude is an easier matter to settle than the latitude; while he has evidently not reflected upon the immense and variable amount of mirage and refraction which would result from using at noon the sea horizon of a "quiet lake" situated directly under the equator.

The Victoria Nyanza, I have said, is now assuming an intelligible topographical shape. We hear nothing of the three great outlets, the Napoleon Channel, the Luajerri, and the Mwerango (Merango) which for the last decade have disfigured our maps. We read for the first time of the important north-eastern influent, the Ugoweh, and of the great south-eastern feeder, the Liwumbu-Monangah-Shimiyu. These absolute gains to geography, one of them numbering 350 miles in length, are simply due to the energetic explorer. We find Mazita or Majita converted from an island to a headland by Mr. Stanley, who approached it from the east, whereas Speke's terminus Muanza (1858), was to west; and the reader of my *Lake Regions* (vol. ii., p. 214) will remember the doubts concerning its insular nature, which the accounts of the Arabs awoke in my mind. From information I was able to state that the "Jezirah," an ambiguous term, meaning equally *insula* and *peninsula*, can scarcely be called an island; and in my map Mazita is dotted towards the mainland. We are also relieved from having to believe in a sheet of water whose level was nearly 500 feet higher in the

* My article appeared in the *Geog. Review*, of May, 1873.

south (3740 feet) than in the north (3308 feet).* My friend Captain C. George has ably shown (*Daily Telegraph*, Oct. 18th) the provisional value of the last measurements, and this practised calculator states that "Mr. Stanley's result (3808 feet) agrees so closely with Captain Speke's that it must create a favourable impression on scientific geographers."

On the other hand, we are absolutely non-plussed by the statement of the Anglo-American Expedition that during fifty-eight days their brave little boat, the 'Lady Alice,' "had surveyed over 1000 miles of lake shores." And the editorial article (Oct. 18) adds that the "sea of rhomboidal outline" measured about 230 miles long by some 180 broad.† Of course these are round numbers and general assertions; but they are not the less puzzling. Mr. Stanley after leaving Kagehyi and embarking on the lake, bends for a short distance to the east and then turns directly northwards; thus cutting off a huge eastern slip, at least one-third, from Captain Speke's "dodo-like" form. In this matter his course nearly corresponds with the line which I laid down in 1859 (*Journal R. G. S.*, vol. xxix). The whole western and southern shores must remain they were, for here we have the careful latitudes and longitudes of the Speke and Grant Expedition (1860-63); and, finally the northern cannot, according to the explorer's observations, be removed far north. Yet Mr. Stanley gives his lake 1000 miles, when the whole circuit of Captain Speke's is only 680 miles (direct geographical); and the area of the new Nyanza 32,515 square miles (230 and 180), nearly equals that of the old (40,000).‡ Here, then, is something wrong, unless the explorer, including every little projection and indentation of the shore, "bends, curves, inlets, creeks, bays, capes and debouchures of rivers," prolonged to 1000 miles what his map reduces, we will say, to 550.

Mr. Stanley has successfully proved, versus Major Long, that the Nyanza is even larger than I made it in 1859 (250 by 80 miles); it has become, in fact, one of the finest of inland seas in the world; but he has by no means been equally successful in establishing the theory that Captain Speke's Nyanza is a lake and not a lake region. He tells us baldly "They (the natives of Muwanda) gave us all the information we desired"—a very usual phenomenon amongst Asiatics and Africans. "Baringo" he continues, "they said, is the name applied to the people of Ugana to Nduru, a district of Ugeyeya, and the bay on which our boat rode, the extreme end of the lake; nor did they know, nor had they heard of any lake, large or small, other than the Nyanza." The Lake Baringo of Dr. Krapf and of Messrs. T. Wakefield and C. New (1865 and 1866-67) and the Bahári yá Pili (the Second Sea) *alias* the Bahári yá Ukára (Sea of Ukára) laid down by the two latter gentlemen, are not to be disposed of by the chance words of a few blacks. Mr. Stanley evidently knows nothing about the Baringo, except what he has seen in Captain Speke's map, the work, I may say it without indiscretion, of my friend Mr. Trelawney Saunders. In an earlier letter of more sober style, the traveller tells us, "I have questioned the natives of Uchambi closely upon the subject at issue, but no one can satisfy me—though they speak positively—whether the lake is one piece of water or more. I hear a multitude of strange names, but whether they are of countries or lakes it is impossible to divine, for the people's knowledge of geography is

* A wall-map in the Royal Geographical Society makes the absolute altitude of the Nyanza 4700 feet: this is a mere error, as it applies to the eastern water the correction of 1000 feet which my late friend Mr. Alexander Findlay added from a pencil note by Captain Speke to the Tanganyika Lake.

† The reader will remember that from Arab information I made the sea of Ukerewe (Nyanza), 240 miles long by 80 broad (see *Lake Regions* ii. 212).

‡ Captain George has calculated the rhomboid at this figure upon the data of the axes, 230 and 180 miles.

naturally very superficial." Every African traveller well knows that the tribes with few exceptions are ignorant, except by hearsay, of the lands lying a few marches from their doors; and experienced men attach very little value to the term "boundless." We freely accept as truth all that Mr. Stanley sees, but by no means all that he hears. Indeed the shape of the Nyanza itself must greatly vary with the seasons. The traveller informs us, "The descent to the lake is so gradual that I expect to find upon sounding it, as I intend to do, that, though it covers a vast area, it is very shallow." And in another place we are assured, "In Iramba, between Mgongo Tembo (T'hembo)* and Mombiti, we came upon what must have been in former times, an arm of the Victoria Nyanza. It is called the Lumamberri Plain, after a river of that name, and is about 40 miles in width. Its altitude is 3775 feet above the sea, and but a few feet above (read below) the Victoria Nyanza. We were fortunate in crossing the broad, shallow stream in the dry season, for during the *Masika* or rainy season, the plain is converted into a wide lake." What more do we want to show that this is a lake- or a lagoon-region?

It appears to me then that the controversy which has lasted for so many years can hardly be held finally settled. The Nyanza has certainly been proved to be a vast sweet-water sea, but the collection of minor features cannot be said definitively to have disappeared. On the contrary, when the whole region has been carefully surveyed, we shall probably find large and wooded tracts which, in the wet season, cause the lands about the Eastern-head reservoir of the Nile much to resemble the parts lying near its mouth.

Of the Tanganyika we can only repeat that the mass of evidence, as it lies before us, suggests a dead lake during the aries, drained at times of flood by a northern affluent feeding the "Luta Nzige," and by a western outlet, the Lukuga, falling into the Lualaba. The latter question may even now have been settled by the gallant Lieutenant Cameron, concerning whom we may safely quote the old saw *point de nouvelles, bonnes nouvelles*. Ill tidings fly fast even in Africa, and the long silence of the last months fairly entitled us to hope, even as we wish, for the best.

RICHARD F. BURTON,
ATHENÆUM CLUB, October 19th, 1875.

THE ATTREK BED OF THE OXUS.

SIR, — Excuse my saying a word on your remark,† that in all probability the Tejend is the Ochus. In the first place, there is, I think, scarcely room for two rivers, *i.e.* Oxus and Tejend, to enter the Caspian between the great and little Balkhan Mountains *in separate beds*.

To this, of course, it may be replied that Strabo, xi., c. 7, states that according to some authors "Ochus is only to be regarded as an affluent of the Oxus," and that consequently the Tejend or Ochus probably joined the Oxus before that river reached the Caspian.

On the other hand, Strabo's remark that some geographers said "the course of Ochus was more southerly than, and entirely distinct from, that of Oxus," points to the Attrek as being possibly the Ochus. This also I think is indicated by Apollodorus styling it "the nearest river to the Parthians;" a description applying still more to the Attrek than to the Tejend. Then again, the lower course of the Ochus watered Hyrcania, and though it may be said the waters of the Tejend would have also passed through this country, by the Oxus-Attrek bed, its name should have been absorbed in that

* Not to be confounded with Mgongo T'hembo the "Elephant's bath," in the desert of Mgunda Mk'hali, a place far South. (See *Lake Regions*, &c., i. 290.)

† In *Geographical Magazine* for October, 1875. Editorial note at page 304.

of the Oxus, which it must have met as an affluent, to the north of Hyrcania, and before it reached this country. On the other hand, since water would *in all probability* have only flowed from the Oxus into the Attrek, during the epoch of the summer floods, the Attrek would have flowed as a separate stream during six months of the year, and, in this manner the doubt which Strabo reports regarding the lower courses of Ochus and Oxus would be explained. During the low-water time, Oxus I conceive would have sent its waters directly to the Caspian; for the canal into the Attrek would have to be closed yearly (precisely as is done in Khiva to-day), and allow of the deposited sand being excavated and the bed being so kept clear for the reception of the fertilising water, at the date of the succeeding flood. Then again, in Strabo xi. c. 10, we have a complete knowledge of the rivers Tejend and Murghab (Arius and Margus). "The plains of Aria and Margiana are crossed by two rivers, Anus and Margus, which water them very abundantly," and then a reference is made to the deserts "which surround the plain watered by the Margus." This knowledge of the country in these localities is therefore directly contradictory of the doubt which existed regarding the lower courses of the Oxus and Ochus. And I cannot help thinking that the doubt only arose from the very curious way in which a canal was led through a narrow defile in the Kurrendagh, to alimnt the head-waters of the A trek, or rather of its affluent the Sumbar.—Yours faithfully,

HERBERT WOOD.

P.S.—There is a circumstance which if followed up might assist in tracing the identity of the Attrek with that river. Strabo xi. c. 9, says, "In the neighbourhood of Ochus now it is said the Macedonians discovered a spring of oil by digging." . . .

Compare this with Mr. Delmar Morgan's *resumé* of Stebnitzky's Report on Turkomania *Journal R. G. S.*, vol. xlv. for 1874, p. 221. "Twenty-four versts beyond there is another ford across the Attrek, *Yagly-Olum* (Oil Ford)."

H. W.

Proceedings of Geographical Societies.

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BERLIN GEOGRAPHICAL SOCIETY.

WE have received the "Proceedings" of this Society at their meetings of the 3rd April, 8th May, and 2nd June. At the first of these an interesting paper was read by Freiherr von Troschke on the hydrographical changes which the coast lands of Holland have undergone. These he pointed out have been greater than those of almost any other land. For instance, at the time of the Cimbric invasion the mainland was far more extensive than at present, and the Zuider Zee was an inland lake of moderate size, called *Fledo*, a name still recognizable in the island *Vlieland*. In the thirteenth century the greater part of this coast land was swallowed up by the sea, and in 1272 a similar fate overtook the land at the mouth of the Ems, where the *Dollart* is now situated. Since the flood of 1421 when the *Biesbuch* near Dordrecht was formed, no violent change has taken, and, owing to the increase of works of reclamation, the inroads of the ocean have been more regularly compensated for. As, however, the new land is in many cases as much as 12 feet below the level of the ocean, strong embankments have become requisite to guard against inundations. The *Haarlem Sea*, which the Prussians sailed across in the campaign of 1787, is now an extensive plain, with well cultivated and populous villages. A beginning has been made of the great scheme for drying up the *Zuider Zee* by the adoption of measures for drying up the *Y*. In its place there will be

a navigable canal, starting from the Dunes, by the North Sea, and the breakwaters at its mouth are fast approaching completion. One effect of this mighty reclamation will, in all probability, be to make the force of the tidal waves much more felt in the recesses of the coast to the north, such as Jahde Bay. In the same number we are favoured with a memorandum by Baron Von Richthofen, on the first instalment of geological maps recently issued by the Royal Geological Institute; a paper on the German Expedition for the observation of the transit of Venus at Ispahan in Persia, which was read by Herr G. Fritsche, at the 8th of May, and a full account of the meeting of the 2nd June, together with a reprint *in extenso* of the interesting paper read by Dr. Nachtigall, on his explorations in Central Africa.

MEXICAN GEOGRAPHICAL SOCIETY.

WE have received the "Proceedings" of the Geographical Society of Mexico for 1874-75. Citizen Ignacio M. Altamirano, the indefatigable Secretary, continued at his post, and the President, as provided by law, was the Minister of Public Instruction. The meetings took place every fortnight, and several interesting papers were read. The most important were on the geology of the district of Xochitepec, a few leagues south of the city of Mexico; on the geography and statistics of San Luis Pot si, and on the famous aerolite of "La Descubridora." The annual address, on April 28th, 1874, the 23rd anniversary of the foundation of the Society, was delivered by the mining engineer, Santiago Ramirez.

Mr. Clements R. Markham, C.B. and Mr. Maurice Kingsley were elected Honorary Members of the Society.

"COSMOS," No. 1 OF 1875.

SIGNOR CORA'S periodical opens with a proposal for the establishment of an Italian Hydrographical Office in connection with the Marine Department. He draws attention to the increasing importance attaching to scientific research by means of such expeditions as those of the 'Lightning' in 1868, the 'Porcupine' in 1869 and 1870, the 'Challenger,' the United States vessel 'Tuscarora,' and the 'Gazelle,' belonging to the German Navy. He also points out the delay which has attended the publication of the results of the expedition of the 'Magenta' in its voyage round the globe from 1865 to 1868, the natural history being even now the only branch which has been published, the hydrography still remaining uncared for. Similarly, through lack of a central department, charged with the duty of seeing to the publication of results, the careful journals and minute observations taken on board the 'Princess Clotilde,' 'Vedetta,' 'Vittor Pisani,' and 'Governolo,' lie unused in office pigeon-holes—a course which, as Signor Cora truthfully points out, involves a sheer waste of nearly all the money laid out in the expeditions themselves. He earnestly trusts that the voyage of the 'Garibaldi,' honoured as that vessel was with the presence on board of Prince Thomas of Savoy, may be the occasion of following the worthy example of England, France, Germany, Russia, and Austria, and creating an institution of the kind referred to.

The next two articles are a notice of H.M.S. 'Challenger's' voyage from Australia to Manila, being the substance of a paper read by Professor Wyville Thompson, before the Royal Society, on the 4th February last, and an account of the levelling operations effected by Colonel Tillo, between the Caspian and Aral Seas.

The most important article in the present number is an account by the editor himself of his recent journey in Albania. Signor Cora remarks upon the anomaly that an European country should be indebted to foreign nations for charts of its own coasts, and to private travellers for very sketchy maps of its interior territories. The best map of the parts traversed by Signor Cora is

Kiepert's Thessaly and Epirus, in two sheets, scale, 1:500,000. But this shows several blanks, and it was with the view of filling these up that he undertook his exploring trip. Before crossing the Adriatic he spent two weeks at Brindisi, in examining the harbour and its approaches, and came to the conclusion that there are many improvements necessary before this port can take its proper rank as one of the best and safest harbours of the Mediterranean. He then took passage in a small Turkish craft, and landing at the entrance of the Voiuzza River, made his way on foot to Valona, a pretty, but low and unhealthy town. After spending a week here, making preparations Signor Cora made straight for the interior. On the third day he ascended Mount Kudusi (6265 ft.), a conspicuous landmark for miles out at sea, which is not laid down on Lehnert's map. After visiting the ruins of the ancient Amantia, he travelled on to Berat, the most important city in Epirus after Yanina, with a population of about 10,000 souls. An ascent of the Lumi Beratit or Semeni River brought him into the district of Colonia, where the soil is fertile and the population numerous. Notwithstanding the fact that the district is over-run by a powerful band of brigands, Signor Cora managed to avoid them and execute a careful survey, which was much needed, as Pouqueville and Barth's researches had given a very incorrect impression of the country.

At Yanina, whither he journeyed southward, he made an examination of the lake, and found that its average depth was only 16 feet, though the inhabitants of the town avowed it to be as much as from 15 to 20 fathoms. Going on from thence to Corfu, Signor Cora hired a yacht and explored many of the anchorages and harbours in the vicinity, noting various modifications in the English Admiralty Chart of 1865 by Captain Mansell. Having received from Italy a supply of better instruments, he returned to Yanina by a northern route through an unexplored country, but the rains came in such abundance as to render surveying a matter of great difficulty. At Yanina Signor Cora received a courteous offer from Mustafa Assim Pasha, who had already materially aided the exploration, to accompany him to his new post at Tripoli, in a Turkish man-of-war. This offer Signor Cora gladly accepted, and remained at Tripoli till December, accumulating a stock of information respecting the oases of the desert, and the trade-routes to Wadai and other places.

Signor Cora proposes to publish, in three separate instalments, the detailed scientific results of his journey. He will also eventually publish a large-scale map of Lower Albania, from his own surveys, on the scale of 1:100,000; but this will not appear for some years, as it is to be supplemented by further exploration.

NOTICE.

The Office of THE GEOGRAPHICAL MAGAZINE is at 57 & 59, Ludgate Hill, E. C.

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Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

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THE
GEOGRAPHICAL MAGAZINE.

DECEMBER, 1875.

THE ARCTIC EXPEDITION.

V.

FROM RITENBENK TO UPERNIVIK.

OUR latest news of the Arctic Expedition, brought home by Captain Allen Young, was dated the 26th of July, off one of the Cary Islands, but it only commenced from leaving Upernivik, and left a gap between the time of parting company with the 'Valorous' at Ritenbenk and the arrival at Upernivik. This gap has now been filled up by the arrival of the Danish brig 'Constance,' at Copenhagen, on Tuesday, the 16th of November, with a bag of letters from the 'Alert' and 'Discovery.' The news thus received is only interesting in itself, but completes the history of this great national enterprise up to the 26th of July, which otherwise would have been fragmentary.

It will be remembered that the 'Valorous' left Ritenbenk for the coal-mine in the Waigat, at 4 A.M. of July 17th.* The 'Alert' and 'Discovery' followed at 6 A.M.; threading their way down the Waigat, through countless icebergs. Although keeping a sharp look out for the 'Valorous,' she was not seen until the expeditionary ships were several miles dead to leeward. Captain Nares then hauled to the wind and beat up, as he had sent no private letters from Ritenbenk. Commander Markham had a whale-boat all ready, and intended himself to take the letters on board, but a thick fog came on, and it would have been almost madness to have attempted to look for the 'Valorous' in the maze of drifting bergs, so the captain, very wisely, altered course for the mouth of the Waigat. Whilst they were beating up towards the 'Valorous,' the officer of the watch, thinking he was going to weather an iceberg, stood on, but the ship drifted bodily down on it, and all the boats on the port side were as nearly as possible lost. The 'Alert' scraped right along the side of the berg, but providentially without serious damage.

On the night of Saturday, the 17th, the fog was so dense that it was determined to make the ship fast to a berg, and await clear weather. They sailed quietly up to a large solid-looking mass, and lowered the ice-boat with David Deuchars, the ice-quartermaster, Reuben Francombe, a maintopman, and two other hands, to drill a hole and make fast an ice-anchor. Deuchars, however, had no sooner struck the ice, when a loud crack was heard, followed by a tremendous report and

crash. The berg had calved, sending Francombe, who was actually standing on the calf, flying out into the water, whilst Deuchars was thrown head downwards into a rent, by the rolling of the main piece, and the ice-boat was nearly swamped by the commotion of the water.

Commander Markham immediately lowered the cutter, and went off in her to render assistance, not knowing whether the men and boat were safe. To his great relief he saw the men emerging from a sheeting mass of ice fragments. They had had a wonderful escape, but no one was seriously hurt.

It was a good thing when the 'Alert' and 'Discovery' were well clear of this dangerous Waigat, and making their way north, round the Swarte-huk. By 8 A.M. on Sunday they were off the Omenak Fjord, with a fair wind and heavy rain, which was welcomed as an active agent in rotting the ice in Melville Bay. On Monday the 19th of July, at midnight, they arrived off the little Danish settlement of Proven. Here they engaged Hans Hendrick as dog-driver for the 'Discovery,' and fortunately he consented to come without his wife and children. Hans served in all three American expeditions up Smith Sound, and has had much experience at the work. A dozen more good dogs were also procured, ten for the 'Alert,' which makes the number up to 34, and two for the 'Discovery,' making her number 27, altogether 61 dogs.

On Tuesday all the executive officers were engaged in surveying the harbour of Proven. Commander Markham and Lieutenant Parr worked one theodolite, Lieutenants Aldrich and Giffard another, and the officers of the 'Discovery' a third; while Lieutenants May and Egerton sounded. Commander Markham and Lieutenant Giffard got good observations for dip and intensity. Dr. Moss had been busily engaged with the surface dredging, finding many organisms under the microscope that were new to him.

Information was obtained at Proven respecting the season and the state of the ice. The whalers had not been able to get through Melville Bay at first, and returned to Upernivik, where they remained eight days. They made a second attempt in about the first week in June, and got safe through. The summer at Proven had been quite as late, allowing for difference of latitude, as at Godhavn; snow was covering the hills, and in some places coming down to the water's edge. Northerly winds had been almost constant. In March it blew from the north fourteen days, in April seventeen days, in May no less than twenty-six days, and in June nineteen days, so that there

* See *Geographical Magazine* for October 1875, p. 299.

must have been a remarkable clearing out of the ice.

On leaving Proven, at 5 P.M., on Wednesday the 21st (the 'Alert' towing the 'Discovery'), the two ships proceeded to the far-famed "loomery" at Hope Sanderson, the furthest point reached by gallant old John Davis in 1587. The quaint name was given to this magnificent cliff by its discoverer, in honour of one of his supporters, a merchant of Bristol. We passed it in 1850, just a month earlier, and Hope Sanderson is thus described by our dear old messmate Sherard Osborn:—"Well worthy is it of the name of one whose liberality had tended to increase England's maritime fame; and the Hope's lofty crest pierced through the clouds which drove athwart its breast, and looked afar to see 'whether the Lord of the Earth came not.' Under its lee the water was a sheet of foam and spray from the fierce gusts which swept down ravine and over headland; while against the base of the rocks, flights of wild-fowl marked a spot famous amongst Arctic voyagers as abounding in fresh food."

A quarter of a century passed away and another gallant band assembled off the same glorious headland, at 1 A.M. of the 22nd of July, 1875. It is a magnificent precipice, rising sheer out of the sea to a height of 3300 feet. As of old, myriads of looms flew to and fro, and perched in long rows on the ledges of rock. The ships remained about two hours. Boats were lowered and 173 looms were bagged, the 'Alert' shooting 122, and the 'Discovery' 51. They would have got many more, but the sea was so rough that it was difficult both to handle the boats and to shoot straight, and many birds were lost. However, fresh meat was procured, sufficient to last for two days, for officers and men.

At 6 A.M. of July 22nd the expedition anchored off the Danish settlement of Upernivik. The Governor's wife is "Sophie," a charming Greenland lady, whose acquaintance was made, and whose pleasant smile was long remembered by the officers of former expeditions. The 'Alert' brought out for her a present of a tea-service from Sir Leopold M'Clintock.

At Upernivik, as in Disco Island, there had been a remarkably mild winter, but a hard spring. The month of June was especially cold.

Commander Markham has sent home some very ancient flint instruments, taken out of old graves near Upernivik; and Captain Feilden obtained others in the neighbourhood of Proven. Those sent by Commander Markham are five in number. The two most perfect specimens are beautifully-finished arrow-heads, the broadest part about two-thirds the whole length from the point, and thence curving inwards—one $1\frac{1}{8}$ inch by $\frac{1}{2}$ an inch, the other and most perfect specimen $\frac{7}{8}$ of an inch by $\frac{3}{8}$. They were probably used as bird darts, and are of a dark and opaque flint-like stone. The other specimens are less perfectly chipped, but are quite as interesting, from being of a transparent stone. Before the Eskimo of these parts obtained the use of iron, their arms as far back as anything is known of them, were of bone, so that there can scarcely be a doubt that these flint instruments are very ancient. The northern Eskimo tribe between Cape York and Smith Sound, used meteoric iron for knives and other weapons, and one of these knives is in the British Museum. The finding of the flint arrow-heads in the districts of Proven and Uper-

nivik is even more interesting; and we trust that it may be the prelude to important ethnological discoveries after the threshold of the unknown region has been crossed.

The expedition remained two hours off Upernivik, and again sailed on July 22nd, at 8 A.M. The account of its most remarkable voyage through the middle pack to the Cary Islands will be found in our previous number.*

We can receive no further news until the battle has been fought and the victory won. But we can do something more than merely think of our gallant countrymen, far away in that desolate unknown region, suffering the intense hardships of an Arctic winter, and resolutely preparing to encounter far greater hardships and dangers in the spring. Those who stay at home at ease are bound to see that the absent explorers are not neglected. It is essential to their welfare, perhaps to their safety, that annual communication be kept up with them, as was done in the case of the expedition of 1852-54. While they work so hard for England in those desolate regions, the people of England are bound to see that their interests are not neglected here, and that a vessel is despatched, in 1876, to communicate with, and if need be to succour the Arctic Expedition, which will then have been more than a year unheard of, and with its fate unknown.

THE VOYAGE OF THE 'CHALLENGER.'

IX.

THE vacancy caused in the command of the expedition by the recall of Captain Nares to command the Arctic Expedition was filled by the appointment of Captain Frank Thomson, then in command of H.M.S. 'Modeste' on the China station. That Captain Thomson laboured under a disadvantage in taking the place of Captain Nares, we can well suppose; but the result of the section of the cruise of which we are now to give a *résumé*, well justifies our saying that the selection was a wise one, and that, supported as he is by gentlemen well acquainted with the peculiar duties entailed on them by the nature of the voyage the ship is on, the continuation and completion of the undertaking will be successful.

Having thoroughly refitted and completed provisions, the 'Challenger' again put to sea on the 6th of January of the present year, and at once ran into a fresh monsoon, accompanied by a heavy sea. On the 8th, in the morning, the wind having somewhat abated, a sounding of 2100 fathoms was obtained with grey ooze bottom, and as the position was one of interest, being in latitude $17^{\circ} 54' N.$, and longitude $117^{\circ} 14' E.$, near the centre of the China Sea, they were anxious to verify some thermometric observations that had been previously made; serial temperatures were therefore taken at every 50 fathoms to 400 fathoms, and every 100 fathoms to 1000. At 900 fathoms the temperature was 36° , and this temperature was maintained to the bottom. This agreed very nearly with the result obtained by Commander Chimmo, proving that the China Sea is cut off from the Antarctic basin by a submarine rampart, the top of which is between 800 and 900 fathoms beneath the

* See *Geographical Magazine* for November, p. 328.

surface. The weather remained fine as the ship pursued her voyage back towards Manila, and on the 11th she reached that bay.

The day before getting into port a small dismayed vessel was seen and bore up for. She proved to be a coasting vessel named the 'Santa Maria,' her masts had been cut away and her rudder was gone. Nothing was found on board of her but some pieces of blue jean. As the hull was found to be sound, she was taken in tow and delivered up to the Spanish authorities at Manila.

The 'Challenger' was the bearer of the news that the Spanish people had chosen another king in Don Alfonso, which intelligence created little interest and no excitement: they thought more of the changes that would take place amongst the deputed authorities than anything else; and could they, like the Vicar of Bray, retain their positions, it mattered but little to them what form of home government existed.

Leaving Manila on the evening of the 14th, the next day they passed through San Bernardino Strait, greatly admiring the rich and varied scenery on either hand, the high volcanic ridges being densely wooded to the summits, whilst lower down the patches of sugar-cane and bright green grass showed out in marked contrast. The island of Mindoro presented little sign of cultivation: it is said to abound in deer and other game, and to be inhabited by a race of Moros inimical to the Spanish rule, and considered beyond the pale of civilization.*

About noon on the 16th they passed through the narrows among the islands, and into a little enclosed sea about 70 miles long and 35 wide, extending from the north point of Tablas Island to the strait between the north-east angle of Panay and the south-west point of Masbate. It is bounded on the north-west by Tablas, the north-east by Romplon and Sabuyan, and on the south-west and south by Panay, on the south-east and east by Pulanduta point of Masbate, and the shoals and islets between Masbate and Sabuyan and between Masbate and Panay. As this seemed likely to be one of the enclosed basins presenting peculiarities in the distribution of temperature, they stopped to take serial temperature soundings and to dredge. From the depth of 150 fathoms to the bottom at 700 fathoms, the temperature was 51°·7. The temperatures generally were to a certain extent intermediate between those of the China Sea on the one side and the Sulu Sea on the other, leaving it uncertain whether the cleft in the barrier to the depth of 150 fathoms is between Tablas and Panay, or between Romplon and Sabuyan.

Passing along the island of Zebu the next morning, the scenery was very interesting, the island being well cultivated, the brilliant green of the sugar-cane patches relieving the more sombre greens of the Manila hemp-plant and the almost continuous cocoa-nut groves, whilst here and there the basket-like dwellings of the natives, built on piles, could be seen. On passing through the strait between Mactan and Zebu, they obtained a distant view of the monument erected by Isabella II. to the memory of the great navigator Magalhaens, who lost his life on the first-named island.

In the afternoon of the 18th they anchored off the town of Zebu, a thriving place, doing good business in sugar and hemp. The residents at Zebu proved more

loyal than their fellows at Manila, for on receipt of the intelligence of the accession of King Alfonso to the throne of Spain, the European portion of the town was brilliantly illuminated for three successive nights. Zebu, like the others of the Philippine Islands, is not so thriving as it could be, from the lack of labour, this being a vexed question, as it is nearer home. Indeed the produce of these islands would be something enormous were there sufficient labour to develop all its resources; and as in accordance with the old proverb, "Where God does most, man does least," the actual necessities of life growing here spontaneously, and the luxuries being obtainable for the week by one day's labour, indolence seems to be the result; and instead of endeavouring to elevate himself in position in life, all the native cares for is just to satisfy the requirements of nature, and then sleep and smoke his life away. Coal is found on the island, and, properly worked, would supply the whole of the archipelago, but the want of labour is the one great desideratum.

The natives, like those of Manila, are rather a handsome race, the women in particular; they have an abundance of jet-black hair, which they allow to fall loose down their backs, and this, with their brightly coloured dresses and handkerchiefs, give them a very picturesque appearance. The houses of the natives are built after the Malay fashion, on piles, and generally thatched with cocoa-nut leaves or long grass.

The good people at Zebu, amongst whom were English, Americans, and Germans, were very hospitable, the English Consul getting up a *tertulia* in honour of the strangers.

The mode of fishing for the *Euplectella* is thus described by one on board:—"One special object which we had in selecting the town of Zebu as a place of call, was to make out, if possible, something of the habits and mode of life of the beautiful sponge, the 'Venus' flower-basket,' which has of late years become so common in London, as an ornament in the form of an infinitely delicate skeleton of silica, like a horn of plenty, made of lace work of spun glass. We had seen several of the skeletons at Manila cleaned and prepared for being sent to Europe; and we were told that they all came from one spot off the island of Mactan, close to Zebu. We had no sooner landed than we saw the sponges about everywhere, and we had no difficulty in getting a couple of fisherwomen, on the following day, to consent to guide us to the spot where they were found. The Indians came to us early in the morning and we started with them in the steam-launch to the village about 6 miles off, where they lived. There we took in two very curious and ingeniously-contrived instruments with which they bring the sponges up. Two long strips of bamboo meet at an angle of 45 degrees, and are fixed in that position by an elaborate system of stays of bamboo, which are attached to a piece of wood, which runs back from the angle, between the two arms, or wings, of the machine. The piece of wood is weighted with stones, and a line is attached to it, so that the machine is pulled along on the bottom, with the angle in advance, and the two wings sloping backwards, one on either side. The outer edge of each of the bamboo rods is armed with between thirty and forty large fish-hooks, with their barbs set forwards towards the angle. The *regaderas*, as the Spaniards call them, are

* The *Times* correspondent on board the 'Challenger.'

found at a depth of about 100 fathoms. The Indian lets down the bamboo arrangement with a strong fine line of Manila hemp, and pulls it slowly over the ground; every now and then he feels a slight tug, and at the end of an hour or so he pulls it in, with usually from five to ten *regaderas* entangled on the hooks. *Euplectella* has a very different appearance, under these circumstances, from the cones of glassy net-work in the British Museum. Its silver beard is clogged with the dark gray mud in which it lives, buried to about one-third of its height, and the network of the remainder of the tube is covered with a pall of yellowish fleshy matter, which gives it a heavy look and greatly diminishes its beauty. The layer of flesh is not so thick, however, as we expected, and only slightly masks the form of even the detailed sculpture of the sponge. It is not nearly so thick and spongy as it is in another species of the same genus, which we dredged off the coast of Portugal."

From Zebu Captain Thomson decided to visit the volcanic island of Camiguin, in order to ascertain if the presence of that large and active volcano had any influence on the temperature or conditions of the water in its neighbourhood. On the 24th they left Zebu, and the following morning sighted Camiguin, which was easily distinguished by the smoke rising from the volcano. A sounding was obtained near the island, in 185 fathoms, with a bottom temperature of 57 degrees. From this it was found that the volcano did not affect the temperature of the sea. At noon a party was landed to examine the volcano, whilst the ship proceeded to the village of Agajo, off which she anchored. Camiguin is about 14 miles long by 9 broad, and at one period was a fertile and flourishing island, with a population of about 25,000; it is now reduced to a few hundreds. The principal town, Catarman, was entirely destroyed by the volcano that sprung up so close to it; the lava is now hiding the site. After the first eruption of this last volcano, the earthquakes, which had before been frequent, ceased, and since then the mountain has gradually and steadily increased in size. At the end of the first four months, it was about a third of a mile in diameter, and about 400 feet high. It is now, after an interval of four years, nearly 2000 feet high, and descends with a steep angle to the sea. Leaving the same evening, they anchored at Samboanga on the morning of the 29th. The day before reaching this port a sounding was obtained in 2225 fathoms, and serial temperatures obtained to 400 fathoms. Having completed coal at Malinipa Island, they returned to Samboanga, and took on board a stock of pigs and goats for Greenwich Island, and then passing out through Basilan Strait, proceeded on their voyage. On the 8th, in lat. $5^{\circ} 47' N.$, long $124^{\circ} 1' E.$, a sounding was obtained in 2050 fathoms, red clay bottom: the serial temperature produced the same results as had been previously obtained in the Celebes Sea. After passing through Sarangani Strait, a course was steered for Mata Island; but although only 6 miles from its assigned position, it was not seen. On the following morning Meangis Islands were seen. Whilst dredging off the islands, a large canoe came out, showing a Dutch flag. The canoe was 30 feet long, and contained twenty-two men, who were of a dark brown colour, and had their hair tied up in a knot at the back of the head. Paroquets and mats were exchanged for tobacco.

On the 12th a sounding was had in 2550 fathoms, with a bottom temperature of $34^{\circ} 6'$; on dredging, the dredge and a large quantity of line was nearly lost, and when it came to the surface, it was found to contain some stones and *one* shrimp. On the 21st, sail was shortened, and Humboldt Bay, New Guinea, steered for. A quantity of driftwood was passed through. On the 22nd a sounding in 2000 fathoms was obtained, in lat. $0^{\circ} 39' S.$, long. $138^{\circ} 55' E.$, then 75 miles from the shore of New Guinea. Serial temperatures were taken to 1500 fathoms, the bottom temperature being $34^{\circ} 4'$ that being the temperature from the depth of 1300 fathoms. The following day at noon the high land of New Guinea was made, and at seven in the evening, after passing between Point Caillié and Cape Bonpland—two rocky bluffs forming the entrance to Humboldt Bay, so named by Captain D'Urville who visited this part of New Guinea in the 'Astrolabe,' in 1827—they anchored soon after in 18 fathoms.

The natives no doubt were greatly surprised at a stranger thus dropping so suddenly among them. They showed lights in different places along the beach; in one place they were so regular in regard to their distance from one another, that it was difficult to conceive that it was not a row of street lamps. Several canoes paddled off to the ship, but would not venture alongside: they lay a little way off, their occupants keeping up a continued chanting noise and howling throughout the night, which, to those who were courting sleep, was anything but agreeable.

On the 24th they shifted berth, and after steaming about for some time anchored in 36 fathoms near Point Caillié. This anchorage was named "Challenger anchorage." Mount Cyclops, a high serrated ridge, rising 6000 feet above the sea, formed a magnificent background on the one hand, whilst Mount Bougainville, 4000 feet high, did the same on the other.

At daybreak the ship was surrounded by nearly a hundred canoes, each manned by from three to six undoubted and unadulterated savages, armed with bows and arrows, spears and stone hatchets, the latter guiltless of the manipulation of "Stone Jack." On lifting the anchor to shift berth, the first turn of the screw created the greatest consternation amongst the natives, those nearest to the disturbed waters springing to their feet and levelling their arrows, as if they expected an enemy to rise up. As the ship steamed slowly up the bay the canoes did their best to keep pace with it. The scene at this time is described as being peculiarly interesting, the beautiful natural wild scenery of the shore with its hills covered to the water's edge with magnificent trees and foliage, whilst around them a moving mass of swarthy figures, many decked gaily with birds' feathers or leaves and flowers, in all the glory of war-paint, and all joining in a monotonous chaunt in unison with the sound of the conch-shells, which gave the key-note, accompanied the ship. It was observed that the men dressed their hair in two distinct ways, probably serving as a distinction of caste or age; the greater number had their hair frizzled, in appearance like a large turban, about 12 to 18 inches in diameter; these had their heads ornamented with feathers, flowers, &c., the others, and decidedly younger men, had their hair cropped close all round, excepting a ridge about $1\frac{1}{4}$ inch long, extending from the forehead to the back of the neck,

With regard to their attire, much cannot be said, for although some few had a small cloth wrapped round the loins, the generality were *in puris naturalibus*; they, however, wore several ornaments, in armlets of shells, necklaces of teeth, and breastplates of boars' teeth arranged symmetrically. Some had boars' tusks joined and thrust through the bridge of the nose, extending from ear to ear, and curved up or down as a moustache, according to the fancy of the wearer. The ornamentation by tattooing was slight, but the colouring of the face by pigments was singular and fanciful. Many were pitted with small-pox, and some had skin disease. They remained alongside the ship the whole day without food, and carried on a brisk commerce, exchanging their bows and arrows, spears, necklaces, and stone implements of various kinds, for hoop-iron, coloured prints, and handkerchiefs: but nothing would tempt them to leave their canoes. The villages had some of the houses on the land among the trees, but the generality were erected on platforms raised on piles a few feet above the sea, the platform communicating with the shore by planks, which answered the purpose of a drawbridge on being withdrawn. The huts are conical, rising to an acute angle at the top, the whole being supported by a central post from which the others radiate. An attempt was made to land, but in some places the attitude of the natives were so unmistakably hostile, that to prevent a rupture it was considered best not to persevere, and the boats were recalled. One boat did land and was well received; and it was evident that time would soon have established friendly relations, but that indispensable requisite was not at the command of the 'Challenger's' captain. From his gentleness and forbearance, however, there can be no doubt he has left a friendly feeling behind, which will be to the advantage of the next ship that visits Humboldt Bay. But few women were seen, and none came off in the canoes to the ship. They were foremost on the land to prevent landing, bringing the bows and arrows from the huts. The matrons were attired in a short kilt, but the younger women and girls were entirely naked.

That there is a great future for this vast island, there can be no doubt, situated as it is so near our own colonies in Australia, and capable of producing so much; for that this country, with its accessible sea coast, should remain unproductive, as far as the great family of mankind is concerned, and entirely closed to commerce, is an anomaly in this 19th century that cannot be well understood. Already the restless spirits of some of our Australian prospecting fellow-subjects are being stirred with the desire to be more intimately acquainted with the *terra mystica* so near them and yet so far off: annexation is spoken of openly, and meetings have been held for the furtherance of that object. We can well imagine what the effect of private enterprise would be to break the spell with such a warlike race; blood would soon be shed, and then a war of robbery, spoil, injustice, and extermination would commence, with the inevitable consequence to the savage of being improved away. Whether in the face of this contingency imperial necessity, in regard to the welfare of our great colonies in Australia, would warrant establishing ports of annexation round the coast, to prevent other nations establishing colonies or strong-

holds so near our possessions, is a question that in the course of time must be faced; or whether our colonies will take the initiative in equipping expeditions, either private or public, for the same purpose; but either one or the other seems to be one of the great questions of the day—the colonies for self-preservation, or the Government for the preservation of the colonies. We cannot hope or expect to make the savage appreciate our necessity, and our great object should therefore be to bring about what must be considered inevitable, with as much protection and as little injustice to the savage as possible; and this can only be done by a great country like ours taking the initiative, and restraining depredators and prospectors by the strong arm of the law.

Finding that more information could not be obtained without the chance of rupture with the natives, the very forbearance being probably misunderstood, the 'Challenger' sailed the same evening (the 24th), and proceeded on her way to the eastward along the north coast of New Guinea. On the 1st of March soundings were obtained in 1070 fathoms, red and grey mud, the bottom temperature being 35.7. On the following day they passed Hermit Island. On the 28th one of the Schouten Islands was seen, and on the 3rd of March they arrived at Admiralty Island. They could not make out the land in consequence of the misty rain, but in the afternoon the weather somewhat cleared and they found themselves at the entrance of a bay on the north-west coast of the island, which they entered, and anchored in. This bay was afterwards carefully surveyed, and named Nares' Bay, after the late captain. As the ship approached the land, several canoes with natives came off eager to trade. The canoes were very superior, and 30 to 40 feet long, being double the size of those seen in Humboldt Bay, with crews of from ten to sixteen natives in each. The body of the canoe is carved out of a single tree, and is symmetrical in form. The natives are a well-made set of men, averaging about 5 feet 7 inches in height, and rather muscular. The women are much smaller than the men, and decidedly inferior in every respect: the colour of the skin is dark brown, and many of them were tattooed, and had circular marks at intervals over the body, which appeared as if they had been burnt in. They have nothing of the appearance of the negro, their noses being well formed and prominent; but the teeth in all are in a state of rapid decay from the universal and constant chewing of the betel-nut. They were certainly more clothed than the Papuans, the majority appearing with a cloth round their loins, and all had a bag containing a knife suspended round the neck, and hid under the armpit. The hair is black and frizzled: it is sometimes tied in a knot at the top of the head by a band of tapa, having the appearance of a *chignon*. An ornament, consisting of a disc of mother-of-pearl, overlaid with a thin layer of carved tortoiseshell, is worn in front of this topknot. Their arms consisted of light spears, 6 to 7 feet long, with heavy heads of obsidian: these they throw with great force and accuracy. In addition, they have the knives before mentioned, which are made of the same material as the spear heads, and are long and sharp.

The natives carried on a brisk trade, exchanging tortoise and pearl shell, spears, knives, hatchets, necklaces of teeth, &c., for old iron-hoop, hatchets, hand-

kerchiefs, &c. Some of the men ventured on board, but they were timid. No opposition was made to landing. They endeavoured to keep the strangers away from the villages and kept the women out of sight, but the curiosity of the sex is the same all the world over, and they soon came out in little groups to gaze at the white men: their appearance, however, was not considered pleasing. They were generally tall and gaunt, with long pendulous breasts, and their mouths entirely ruined by chewing betel-nut. Their clothing consisted of two deep fringes of palm-leaves, depending from the waist before and behind. The houses were somewhat like those of the Papuans, being of a bee-hive shape, supported by a central post: the floor is arranged with sleeping mats, the outer circle being for the young men, and the inner for women and married couples. Their cooking and other utensils were well designed and even elegant in shape, and frequently carved in elaborate patterns. The village is surrounded by a palisade of logs about 5 feet high. The natives took a party of the officers to an island where they indicated some pigeons were to be had. As they neared the island a deep cooing sound was heard, and clouds of birds rose from the trees. On landing the noise was almost deafening, and the place was swarming with large nutmeg pigeons. The shooting could scarcely be called pigeon-shooting, it was more a case of pigeon-butcherery, but they did not prove so good for the table as they looked, the flesh being dry and without flavour. Endeavours were made to ascertain how they disposed of their dead, as no graves could be traced; and it is greatly to be feared—if our voyagers rightly understood the pantomimic explanation of the natives—that they disposed of their dead by feeding the living, in other words, they boil and eat them, and they very emphatically explained to the enquirers that they would be very happy to eat them if they had the opportunity. As large numbers of human bones were found in pots, mixed with those of the lower animals, it can scarcely be doubted that their explanation was too well understood. Altogether, the natives of Admiralty Island stood in fair contrast with their fellow savages of Humboldt Bay; they were certainly more honest and friendly, and after a little time allowed the strangers to walk about anywhere without hindrance; but the greatest care was taken not to intrude or in any way offend them.

On the 10th of March the 'Challenger' steamed out of Nares' Harbour. It was Captain Thomson's intention to visit Hogolu in the Caroline Islands, but he gave up the intention, hoping to fetch Gaum, one of the Ladrone's, but the prevailing north-easterly wind and westerly current, from the second day after quitting Nares Harbour, carried the ship to the westward of both groups without even sighting one of the islands. The course from thence to Japan was practically on the meridian, or nearly north and south, there being but little difference of longitude. In the sea between Papua and the stream of islands forming the Caroline Group, depths were found from 2650 fathoms to 2325, principally with the red clay bottom; but those islands passed, the deepest sounding of the voyage was had, and it may be added the deepest authentic sounding ever taken, for although a somewhat deeper sounding is reported to have been taken

in the United States vessel 'Tuscarora' off the east coast of Japan, it lacked the corroborative evidence of a bottom specimen, and we are glad to record that this sounding of the 'Challenger' is placed beyond a doubt by it being repeated with nearly the same results, the first giving 4575 fathoms, and the other 4475. This remarkable sounding was obtained in latitude 11° 23' N., longitude 143° 16' E., or nearly midway between the most southward of the Ladrone Islands and the north-easternmost of the Pelew Group. The first sounding was taken in the morning, and only a small specimen of the bottom being brought up, and also from the extraordinary depth found, it was decided to repeat the operation, the ship having drifted a little in the meantime. Three out of four of the Miller thermometers succumbed to the enormous pressure they had to bear—between five or six tons to the square inch. As a proof of the perpendicularity with which the sinkers descended, particles of the mercury from the broken thermometers were found imbedded in the red clay brought up on the tube. The remaining thermometer registered a temperature (corrected for pressure) of 34°.5, so that at that spot there is a layer of water of that uniform temperature for 3075 fathoms. 200 miles north of this position the water had shoaled to 2300 fathoms and it continued at nearly that depth (increasing only 200 fathoms) to within 150 miles of Japan. The trawling operations on this last section of the voyage were not very successful, the great depth of water and the nature of the bottom not being favourable for the purpose.

The expedition reached Yokohama on the 11th of April.

6½ miles

J. E. DAVIS.

N. P. BARBOT DE MARNY'S GEOLOGICAL EXPLORATIONS IN THE REGION OF THE AMÚ DARYA.

(Read at a Meeting of the Russian Geographical Society,*
March 5th, 1875.)

IN the course of last summer I made a geological journey from the Fort Alexandrovski on the Caspian to the foot of the Thian-shan. The expenses of this expedition, which extended over six months, were borne by the Society of Natural History of the St. Petersburg University and by the Russian Geographical Society. A full report of my researches can be made only after the vast materials collected by me shall have been sifted, and my hypsometrical observations computed, but I hasten to place the Society in possession of the general results obtained.

Our first geological information respecting the district of the Amú Darya is due to Basiner, who, in 1842, accompanied the embassy of Colonel Danilevski. His observations were of a fragmentary nature. Amongst other specimens he brought back with him a few rocks from the Sheikh Jeili Hills, which Helmersen determined to be varieties of diorite and quartz. The officers attached to the expeditionary force of 1873 likewise collected a few fossils and rock specimens along the right bank of the Amú, between Uch-Uchak and Meshekli, and these proved that the cretaceous formation existed there.

* *Isvyestya*, xi., Part II. 1875.

I now turn to my own explorations. About the middle of June my travelling companions, MM. Bogdanof and Butler and myself reached the western shore of Lake Aral, where a schooner awaited us, and brought us to the mouth of the Amú, where we were transferred to the steamer 'Samarkand,' which had just arrived from Kazalinsk. When within $1\frac{3}{4}$ mile of the Kichkine-Darya mouth of the Amú, we observed that the grey water of the river took the place of the pea-green water of the lake. The delta presented itself as a green carpet of unbounded extent. It was covered with cane, attaining a height of 21 feet. Having ascended the Kichkine-Darya for some distance, we met with dry land, consisting of grey muddy clay, covered with cane. On reaching the Ulkun-Darya the river widens occasionally, and forms the lakes Kara-kul, Sary-kul and others, and auls of Karakalpak make their appearance. Having ascended about 52 miles, we reached the Kashkana Tau, an isolated hill, attaining a height of about 300 feet. Here we left the steamer. This hill has a flat top. Its western slope is steep, and forms two terraces, the upper consisting of greyish-yellow sand, containing concretions of gypsum, the lower of greyish-green sandy loam. The lower of these terraces terminates in peculiar cap-shaped hillocks, some of which are quite isolated. These are generally ascribed to the action of the waves of an ocean, which travellers imagine to have existed here, but they are evidently due to atmospheric erosion, the progressive action of which can be traced on the spot. The strata of this hill dip slightly towards the north-east; they contain no fossil, and mineralogically they remind one of the north-western coast of Lake Aral.

From Kashkana Tau to Chimbai (29 miles) we travelled by land. The country is altogether barren, and the eye meets nothing but grey clay, covered now and then with saxaul shrubs. The latter appear frequently sunk below the general surface of the country. This arises from the fact of sand underlying impermeable clay. As soon as the roots reach the former the water begins its erosive action, hollows are formed, and entire shrubs sink into them. On approaching Chimbai the country becomes more animated. There are canals, fringed by gardens and woods.

Chimbai, a small trading town, lies on the river Kegeili, which we navigated in Kayiks as far as Nukus (46 miles). The banks still consist of grey clay, covered with dense canes, saxaul and thorns. On entering the Kuvan-j-Jarma the clay banks visibly increase in height. At length we entered the Amú Darya itself, and were astounded at its volume and rapid current, which reminded us of the Mississippi. Nukus lies at a distance of a few miles from the Amú, on a channel which connects that river with the Kuvan-j-Darya. It occupies almost the apex of the delta, which is formed of grey, tenacious clay, above which rise a few isolated hills, mostly consisting of the same material. These are the remains of dry land, which has been washed away by the river. From Nukus we travelled up the right bank of the Amú as far as Petro-Alexandrovsk, a distance of 104 miles. Close to the river we still met with clay, but on leaving it we at once entered a region of sand-hills, where limestone strata containing fossils of cretaceous age were occasionally exposed. The sand in many places forms ridges, locally termed "Barkhan." Further on

the country rises gradually, and isolated mountains make their appearance. The Besh-Tau constituted a marked feature. It contains many fossils, including ammonites. The *Chalpyk* Mountain rises higher than any other hills in its vicinity. It has two summits, consisting of sand capped by black ferruginous sandstone, which has protected it against erosion. The Chalpyk affords a capital view of the Sheikh Jeili Mountains, which differ from it in their contours, and evidently consisted of crystalline rocks. These mountains lie beyond the lake Khaji-kul, which communicates by a channel with the Amú. We travelled along the northern shore of this lake, where we found chalk. I observed soft sandstones passing into a loose conglomerate, which has partly been worn into *débris*. The chalk-strata on the western slope of the Sheikh Jeili have a dip of 30 degrees.

We crossed the Sheikh Jeili, and returned to the valley of the Amú, along which we continued as far as the town of Bi-Bazar. The country thence as far as Shakh Abbas Wali is the best cultivated within the newly-acquired territory, and there are numerous irrigation canals, with plantations and gardens.

From Shakh Abbas Wali to Petro-Alexandrovsk our road led through a sandy steppe. I extended my researches as far as the frontier of Bokhara, about 40 miles higher up. Our road at first led along the valley of the river, where we saw nothing but clay and cane. But on leaving the valley, hills were met with, particularly near Basargan. Calcareous sandstones, with fossils of cretaceous age, were frequent, and near Basargan they formed the banks of the Amú, which are steep and elevated there. Elsewhere terraces were observed. At Mesherkli, on the frontier, many fossils were likewise met with.

From Mesherkli, 270 geographical miles above the Amú mouth, I returned to Petro-Alexandrovsk, whence I made several excursions into the Sheikh Jeili Mountains. I went for that purpose to Shakh Abbas Wali and Kalendar Khan, which are both on canals, but likewise obtain some water from wells, which are bored through the clay until they reach the sand.

The Sheikh Jeili, as seen from Kalendar Khan, presents an undulating contour, above which rise a few prominent summits, the highest of which is called Ka-gan Tau. This was the goal of my first excursion. On the road a dry arm of the Amú-Darya is crossed: it is said to extend from above Petro-Alexandrovsk to Shurakhan, and we found fresh-water shells in it. In the transverse valleys of the Sheikh Jeili we met with slates and gneiss, and occasionally crystalline limestone. Further on, we found chlorite, talc, and hornblende schists. The schists frequently contain small crystals of magnesite quartz and pyrites, and are traversed by veins of quartz. Copperas occurs in quantities too small to repay working it. There are traces of former mining operations, especially in the talc-schists, but I found not a single trace of ore, and in spite of a report that gold and silver were formerly obtained in these hills, I am of opinion that the search for minerals, though probably repeated frequently in the course of centuries, was never rewarded by discovering the sought for riches. Our return led us through the Sultan-Waiss (Kiepert's Sultan Uweis Tau) Mountain, which consists of layers of white marble, and in which there is an

excellent spring ; strange to say, almost the only one known throughout the region of the Sheikh Jeili. The Sheikh Jeili is altogether barren, and there are neither shrubs nor herbs.

My second excursion was directed to the eastern portion of the Sheikh Jeili. I again crossed the old channel of the Amú, the left bank of which consisted of chalk, which takes the place here of the clay of the Amú and its delta. On approaching the mountains we observed that the hills at their foot were black capped with white. This is due to irruptions of quartz. On ascending the mountains by the road leading to Korjui we found that they consisted of several parallel chains. The first of these consists of black gneiss ; the second of reddish marbles, the others of chlorite and talc-schists. On the return journey our attention was attracted to a large mass of white rocks, which turned out to be protogine, and contained almandines and beryls. The specimens found by us were inferior, but more valuable ones may possibly be discovered.

Our third excursion was made along the Daukara road, which crosses the more westerly Kazgan Tau. We met there with the same rocks, but the strike and dip differed. Sometimes the strata were perfectly vertical. When I reached the water-parting I found that it consisted of sedimentary rocks, and the schists were overlaid by sandstone of a dirty yellowish colour. The water-parting is perfectly level, and offers a fine prospect. The southern slope is exceedingly steep, whilst the northern descends gently to the Kyzyl Kum desert. Towards the west the Sheikh Jeili assumes a north-westerly direction, and likewise merges into the desert.

A fourth excursion was made to the western termination of the Sheikh Jeili, where two offshoots from it approach close to the Amú. They consist both of chlorite schist and marble. On the southern offshoot we discovered the remarkable ruins of the fortress Yampak Kala.

The depression between these offshoots is filled with chalk, horizontally bedded, and abounding in fossils. The northern offshoot approaches close to the Amú at Kasnak, and the Yur-tau, on the left bank of that river, is said to be a continuation of it. The Amú, cannot, however, be said to break through the Sheikh Jeili, which terminates close to it, and the hills on its left bank can be looked upon merely as outliers. The river itself excavated its bed in the chalk.

The general results of these excursions may be said to be as follows:—The whole of the country to the north of the Amú is covered with chalk. The Sheikh Jeili, a mountain mass, 35 miles in length, and consisting of crystalline rocks, gneiss and granite, rises above the chalk. It is the result of successive upheavals, and existed already when the whole of the surrounding country was covered by the ocean, in which the chalk was deposited. The entire valley of the Amú and its delta are covered with grey clay. The only useful minerals observed by us were marble and other building stones. The traces of copperas do not invite further search. There are phosphatic nodules in the chalk, and precious stones in the Sheikh Jeili, but the most useful mineral of all is the clay. The natives build all their houses with it, and its impermeability alone renders irrigation possible.

The oasis of Khiva would not exist without it, and all organic life is confined to the banks of the canals.

After these explorations I made a journey into the desert of Kyzyl Kum, and penetrated as far as Samarkand. Our first geological knowledge of this desert is due to MM. Pander and Eversmann, who accompanied Negri's embassy to Bokhara in 1820. Lehmann, a member of Colonel Butenyef's mission, added little to the information collected by his predecessors. We learn from these travellers that the desert contains clayey soil, sand, and salt-swamps, and that many mountains rise in it, of which the Bukan Tau is the most considerable, and consists of crystalline rocks.

During my excursions on the Amú I had been accompanied by a detachment of Cossacks, but they were able to attend me only as far as Myn-bulak (90 miles N.E. of Meshekli). Thanks, however, to the foresight of Colonel Ivanof, the chief of the Amú district, I and the officer of Cossacks, Grekof, who accompanied me, were placed in charge of two influential Kirghiz, who accompanied us as far as Tamdy, where we were met by men sent from Samarkand to meet us.

From Petro-Alexandrovska we went to Shurakhan. Beyond that place the elevation of the country and the sand increase, until at length we found ourselves in the midst of a sea of sand. We noticed, however, that the sand overlies solid rocks, which form ridges, generally running north and south. *Débris* is frequently found at the foot of these ridges, and ferruginous calcareous sandstones are occasionally exposed on the surface. Now and then we met with salt swamps, the salt being probably derived from the chalk, and salt efflorescences being actually discovered by us upon sandstones.

Our road led over ridge after ridge to the Kara Choku Mountain, which consists of yellow sand capped with ferruginous sandstone. Further on the sandhills much obstructed our progress. We reached the Sandyk Tau, the summits of which are covered with layers of calcareous sandstones, containing fossils of cretaceous age. At Myn-bulak we found a spring of excellent water, a more welcome occurrence as most of the wells of the steppes are slightly brackish. Along the whole of the route, as far as Myn-bulak, I observed large numbers of sand-hillocks covered with saxual and thorn. These shrubs may be looked upon as the preservers of these hillocks, for the loose sand all around them is drifted about at the mercy of the wind, that of which they consist is kept together by the shrubs growing upon them. In the steppes the wind is one of the most important geological agents, destructive as well as productive, and what is done elsewhere by water is effected here by the wind. Occasionally large tracts are covered with hillocks of the kind described, and there is no doubt that the sand of which they consist has been drifted long distances.

The Bukan Tau rose in the north as we approached Myn-bulak. This name, however, is not applied by the natives to the whole of these mountains, for they have special names for every part of them, such as Tobi-bergen Tau, Yirlir Tau, Ui Tau, &c. The main direction of the chain is north and south ; the Tobi-bergen Tau branches off towards the south-west. We reached the Bukan Tau at the spring of Kuldur. It is composed there of strata of crystalline limestone,

striking nearly west and east, and having a dip towards the east. The limestone rests upon clay-slate and is covered unconformably by strata of conglomerate.

The barren summit of the Yirlir rises to the east of Kuldur. It consists of limestone strata, much contorted, and its sides are strongly ribbed. Near the Yirlir we came upon the caravan-road leading from Bokhara to Kazalinsk. In the course of our further march into the Bukan Tau the crystalline limestone was replaced quickly by grey clay-slates and granite. Within the area of the latter we came upon the torrent Bakali, and immediately afterwards we found ourselves in a wild mountain gorge, surrounded by high granitic rocks traversed by veins of black porphyry. On entering the steppe from this gorge, we perceive at once that sedimentary rocks occupy a portion of the lower slopes of the mountain. We journeyed towards the south-east, along the foot of the hills, and at the opening of each transverse valley we met with Kirghiz Auls. The Ui Bukan consists of granite, but on approaching Yuz-Khuduk the mountains appeared to be formed mainly of clay-slates, and there were large masses of quartz.

Beyond Yuz-Khuduk we soon lost sight of the Bukan Tau, but the steppe was elevated, and clay-slates frequently protruded on its surface. The Alty Tau appeared towards the south, the Bas-Tau towards the north. Their geological structure might be guessed at from the *débris* met with along our path, which consisted of black and white quartzite. Now and then we met with cup-shaped depressions or basins, as for instance near Besh-bulak, where fossiliferous sandstone cropped out on the surface. Alty and Bas Tau gradually sunk below the horizon, and we approached the Tamdy-Tau, at the foot of which lies the camp of Dos, the principal Kirghiz chief. The Kyzyl Kum Kirghiz number about 1600 Kibitkas, and nomadize during summer near the springs in the mountains, during winter in the steppes, where they find saxaul. Nature hardly affords them anything. They neither keep horses nor cows, but only camels and a few sheep. They purchase their bread and linen, procuring the money required for that purpose by acting as carriers between Bokhara and Kazalinsk. Their only manufactures are felt, camlot, and ropes. The settlement at the Tamdy consists merely of two or three huts, near which grow a few water and sugar melons. The Tamdy Mountains consist of crystalline limestone, having a north-westerly strike; they have well-defined contours, and are exceedingly steep, which prevented my ascending one of their summits.

At Tamdy we turned towards the south-east, and soon reached the Murun-Tau, which consists of crystalline limestone likewise. We journeyed along its foot. Other mountains rose in the south-east, the western portion of which is known as Aristan Bel Tau, and beyond their eastern extremity the sharp contours of the Kazak Bai Bek Tau made their appearance. These latter consist of limestone, clay-slates and quartzite. On our proceeding further towards the south-east the mountains were less defined in shape, but the steppe itself became hilly, and slates were exposed in places. Beyond the Mas-chi well we at length beheld the Nurata Mountains, still about 60 miles distant.

We travelled straight towards them after we had

reached the Balta Saldyr wells. Our direction was south. The Nurata consists of two parallel chains; their summits were covered with snow. One of the two chains is known as the Ak Tau. It extends from north-west to south-east, and partly lies within the frontiers of Bokhara, whilst the more northerly chain, the Kara Tau, is entirely within Russian territory. The outer buttresses of these mountains consist of black crystalline limestones. They are succeeded by black micaceous clay-slates and black quartz-schists, striking towards the north-west. Then came grey gneiss, and finally granite. In ascending the mountains we followed a transverse valley near a place called Temir Kabuk. They rapidly assumed an alpine character, barren rocks and mountain torrents abounding. The granite soon became the predominating rock, and the whole of the central mass of these mountains consists of it. On reaching the water-parting we found that perennial snow likewise existed towards the east, and that the southern slope was covered with vegetation, and there were fields and gardens along the mountain streams. The northern was altogether barren.

We left the summit and descended into a longitudinal valley separating the central chain from the Ustyug Tau. Our path led over clay-slate. In the valley we found a village (Kishlak) Akchap, in the midst of gardens, abounding in walnut, sandalwood and other trees. The Ustyug Tau consists of clay-slate, and there are masses of conglomerate, horizontally bedded on its southern slope. Having descended the Ustyug Tau, we continued our journey through Bokhars territory, following either the valleys or crossing clay-slate hills. On reaching the summit of the Chirlak we at length caught sight of the valley of the Zarafshan, the dark foliage of the trees fringing the rivers forming a striking contrast with the bright green of the plain. The centre of the valley was enveloped in fog, beyond which rose the contours of the Sarabiz Tau. The valley of the Zarafshan, like that of the Amú, consists of grey loam, and there are numerous cup-shaped hillocks of yellow sandy clay or loess, which have escaped destruction from the floods. Most of these hillocks are surrounded by villages, to whose inhabitants they afford a place of safety in case of inundations. Near the town of Chilek we already found ourselves in the most fertile portion of the valley. Canals of irrigation abounded: there were rice and cotton fields, and a dense population.

We crossed the Zarafshan and several of its branches beyond Daul. Samarkand, with its gardens, occupies a hill consisting of loess, and which is joined in the north to another hill, the Tapanau Tau, which consists of clay-slate and micaceous sandstone, striking north-west. Layers of green marl with gypsum are bedded unconformably upon these, and still higher up we met with horizontal beds of conglomerate. The crystalline rocks of the Chapana Tau are thus identical with those of the Kara Tau, and the marls and the gypsum are probably of cretaceous age.

The distance from Petro Alexandrovsk *via* the Bukan Tau and Tamdy, to Samarkand, is usually assumed to be 400 miles. The results of my journey may be summarised as follows:—

1. We met marine formation along the whole of the route travelled by us, which proves that the Aralo-Caspian at one time extended to the foot of the Thian-shan. 2. There are many isolated mountain ranges in

the Kyzyl Kum, which resemble the Sheikh Jeili and the Nurata Mountains geologically. Their stratigraphical relations are likewise similar, for their strike is generally N.W., varying between W. 15° N. and W. 45° N. We are therefore justified in assuming that the mountains in the steppe form part of the system of upheaval of the Thian-shan. 3. With respect to the origin of the Barkhans or sand-hills, I frequently heard it asserted that they partook of the nature of dunes, and marked the shore of an ancient ocean, which at one time covered the steppes. I found, however, that the material of which they consist may be derived from any geological formation, as long as the sand is not sheltered against the action of the wind. The steppes visited by me are most favourable to the formation of "barkhans," as the prevailing rocks consist largely of sand and soft sandstones. As no vegetation springs up on the latter, owing to climatic and other conditions, they are exposed to the action of the wind. 4. The salt-swamps met with in the desert do not derive their salt from recent marine deposits, which are not met with at all, but from the efflorescence of cretaceous strata.

After a journey of something like 1400 miles on horseback, I found much-needed rest in the city of Samarkand. This certainly is one of the most remarkable places in Central Asia, to the archæologist and historian not only, but likewise to the geologist. I took great interest in examining the building materials employed in the ornamentation of the interior of the houses, and particularly of Tamarlane's tomb. Various kinds of marbles and limestones have been used. A dark-green stone on Tamerlane's tomb, which is mentioned by all travellers, I discovered to be nephrite or Oriental jade.

I feel conscious that this report of my explorations suffers from monotony. But you should bear in mind the almost unvarying uniformity of the desert, where one day seems like the other. Even the scanty results which I am able to submit to you have been obtained at the cost of much labour and many privations.

THE BASIN OF THE MACKENZIE RIVER.

WE have before referred to the explorations conducted by the Abbé Petitot for a continuous period of eleven years, in the basin of the Mackenzie River, in Arctic North America. The long and interesting paper read by him before the Paris Geographical Society, is spread over three of the monthly *Bulletins* published by that body, and we have here reproduced some of the chief points of interest touched upon by M. Petitot. He commences by tracing the route of the traveller from Fort Garry (the outpost of civilization as far as comfortable travelling is concerned) to Lake Athabasca and thence to Fort Good Hope, on the Mackenzie, a most tedious journey, which, from St. Boniface, takes altogether four and a half months—from May to September. Lake Athabasca he describes as apparently resting on a granite formation, and hemmed in on the north and east sides by granite rocks, about 500 or 600 feet in height. It is studded with numerous islets, which bristle with pine-trees, and gives one at a distance the idea of a forest of masts. The climate is milder than that of the Mackenzie, the valley of the

Peace River being more especially known for its great fertility, the excellence and abundance of its timber, and its mineral wealth, which comprises coal, asphalt, sulphur, gypsum, iron and even gold. The granite formations cease on reaching the rapids of the Slave River (the outlet of Lake Athabasca), and farther north lie to the east of a line which, speaking roughly, may be said to run parallel to the Mackenzie, from the mouth of the Salt River to the N.E. angle of the Great Bear Lake. The intermediate region between this line and the Rocky Mountains is occupied by secondary and tertiary formations. The Athabasca and Slave Rivers bring down a considerable amount of *detritus*, which is gradually turning the estuary of the Mackenzie into a huge swamp. The waters of the Great Slave Lake are charged with lime and vegetable matter, and bring down enormous quantities of drift-wood and uprooted trees. In describing the topography of this noble lake the Abbé points out that Lake Aylmer, which drains into the Great Slave Lake, is so close to Lake Sussex, the source of the Great Fish River,* which flows in the opposite direction into the Arctic Sea, that on many maps the two are joined, and the Great Slave Lake is thus represented as possessing the anomaly of a double outlet. This is incorrect, as may be seen by a reference to Sir G. Back's narrative. One of the most important of the present stations in this region is Fort Rae, situated about a day's journey east of the Yellow-Knife River, in 62° 28' N. lat. and 115° 29' W. long. The sandy soil here prevalent is wholly destitute of vegetation, and wood itself is very scarce. The Great Slave Lake is rich in salmon, trout, carp, perch, and other fish, while the banks and inlets are frequented by a large quantity of aquatic game, such as the trumpeter swan, the Arctic duck, &c. The reindeer and musk-ox are also plentiful.

Regarding the Mackenzie, Père Petitot estimates its total length as 2500 geographical miles, and its basin as embracing an area of about 443,000 square miles. The plain through which the river flows is about 400 feet above its level, and the beds which it has successively hollowed out for itself are marked by terraces of former banks. There are only five or six rapids, and these are occasioned by spurs jutting out from the main chain of the Rocky Mountains in a N.N.E. direction. There are eleven trading stations in the Mackenzie district, eight residences of French and one of English missionaries, the Athabasca district having eight trading and four missionary stations. The vegetation along the banks of the Mackenzie is poor; lichens and moss take the place of turf. The white fir, birch, alder, the aspen, and willow are the trees which chiefly abound: to the east is found the steppe-pine, a poor tree, which ranges between 20 and 6 feet in height. The Bank pine, which the Canadians call cypress, does not extend further than the 63rd parallel; the poplar, than the outlet of Great Bear Lake, beyond which it can scarcely be called a tree; the birch and fir cease at the 68° 30' parallel, but willows fringe the delta of the Mackenzie and the banks of the Peel River. The steppes are bare of all vegetation except lichens, Labrador tea and the *Andromeda tetragona*, a plant which, in a country where fuel

*The name of this stream ought really to be Whale River, that being the "great fish" which, by its presence in the estuary, has lent its name to the river itself.

is so scarce, is worth its weight in gold, as its leaves burn equally well green, dry or saturated with moisture. It is, however, confined to the margin of the Mackenzie and the slopes of the Rocky Mountains.

The Abbé is distinctly of opinion that, whatever may be said to the contrary by enthusiasts, the region of the Mackenzie can never be colonized. Culturable ground is only to be found alongside of the Liard River, and in a few islands, such as that on which Fort Simpson is situated, where potatoes, vegetables, and cereals grow, and even wheat ripens in favourable seasons.

The Great Bear Lake is larger than the Great Slave Lake, and consists of five large gulfs or recesses. From October to the middle of July it is covered with ice, varying between 7 and 10 feet in thickness; in its exposed situation it is swept by the most violent snow-storms, called *Kamatsan*, which often wholly bury its sole trading station, Fort Franklin. Although one of the dreariest regions on the face of the earth (the district of Anderson River alone excepted), it is frequented by large quantities of reindeer, while the waters of the lake yield excellent salmon, weighing sometimes as much as 32 kilograms, and herrings (*Clupea harengus*) in great numbers. The lake is fed by 36 streams, and it has one outlet, the Telini-die, or Great Bear River, issuing from Keith Bay. The temperature is lower than that of the Mackenzie district, but still not so low as that experienced by Père Petitot near Fort Anderson, where, in March 1865, he camped out with the thermometer (Fahrenheit) at 62° and 65° below zero, or, in other words, 94 and 97 degrees of frost.

North of Great Bear Lake rise three rivers of some importance, which are new to our existing maps; these the Abbé has named Macfarlane, Anderson, and La Roncière, the first two being supposed by the Indians to be fed by subterranean emissaries from some small lakes. Lake Colville feeds a branch of the Anderson River, and according to Indian report has another outlet in the shape of a subterranean channel communicating with Hare-Skin River and the Mackenzie system, but this theory requires verification. The Anderson is about two or three times as large as the Seine, and towards its mouth attains a breadth of 2 or 3 miles. It contains some capital fish, but in small quantities. The discovery of the Esquimaux Canal, which joins the mouths of the Mackenzie and Anderson Rivers, and of the Esquimaux Lake, have been already referred to in our October number, p. 323.

Speaking of the trade done in the region of the Athabasca, Mackenzie River, the Abbé Petitot refers gratefully to the kind treatment shown to all residents by the Hudson Bay Company, who enjoy a monopoly there. The trade is wholly confined to furs and the like; such as skins of the bear—yellow, white, and grizzly—the fox, lynx, marten, wolf, glutton, ermine, musk-ox, seal, and musk-rat, and plumages of the trumpeter swan, and eider-duck. The Athabasca and Great Slave Lakes are rich in martens, lynxes, sables, and foxes; Fort Good Hope yields gluttons, beavers, wolves, and fine black foxes, whose skins fetch 30*l.* in England, and 40*l.* in America; Great Bear Lake is noted for its otters and beavers, which are also found along the course of the Mackenzie River, while from the shores of the Arctic Ocean are brought

skins of musk-oxen, bears, and white foxes, and swan's plumages. As to the value of the total export trade in furs, Father Petitot is unable to speak, but he testifies with regard to the Mackenzie River, that twelve boats of eight tons apiece, annually journey southward, and giving a minimum of 60 packs of skins to each boat, that gives a total of 720 packs for all the boats. Now as each pack weighs from 70 to 85 lbs. *avoirdupois*, this amounts in round numbers to a total weight of 60,000 lbs. annual export for the Mackenzie district alone. Money is not used in commercial transactions, the unit of exchange being a beaver's skin or *pelu*, as it is termed by the Canadians, which as a rule represents two shillings sterling, thus the skin of a bear, musk-ox, or silver fox, is worth four *pelus*, or eight shillings, ermine and musk-rat skins, six a shilling, and the black fox skin, the most expensive of all, one pound apiece.

The North-West territory is divided into ten districts, of which Athabasca and Mackenzie are the northernmost, each district having its chief trader or superintendent. The forts consist usually of three or four wooden buildings within a square wooden palisade, between 18 and 20 feet in height, with towers or bastions at each angle. The chief house is occupied by the officer and his clerks; on either side are the store-houses for provisions and merchandise, and a fourth long house is divided into sets of two rooms apiece for the servants. The chief factories, such as York factory, Forts Garry, Nelson, and others, are built of stone, and boast some small field-pieces. The Abbé gives a good notion of the distance between these stations, by comparing one of the districts to France, and imagining a factory at the mouth of the Seine, a fort at Paris, a second at Bordeaux, a third at Brest, a fourth at Marseilles, and so on for eight or ten forts.

Once a year, in the early part of June, all the dependent forts in the Mackenzie districts send their furs to the chief station, whence the Mackenzie flotilla convey them as far as the *portage* La Loche, a journey which takes at least two months. Here the furs are exchanged for European goods, brought by boats, which have come up from Fort Garry and Norway House, and the boats having exchanged their respective cargoes, retrace their steps. The furs are taken to York factory, whence they are exported to London. The European goods are conveyed to Fort Simpson, where they are divided among the officers of the different forts, who are thus enabled to pay their debts to the Indians, and give them advances of ammunition, tobacco, hatchets, knives, blankets and provisions.

The chief traders have no fixed salary, but are allowed a share of the profits: this is never lower than 600*l.* a year for the first class of officers, and 300*l.* a year for the second. The clerks get from 75*l.* to 100*l.* per annum, the post-masters 40*l.* to 75*l.*; the half-breeds, who take charge of the boats in their annual journeys, from 28*l.* to 45*l.*, and ordinary servants, 24*l.* All these salaries are exclusive of board and lodging, so, as the Abbé remarks, the Hudson Bay Company's servants are by no means the worst paid in the world.

The white and half-breed population of the Athabasca Mackenzie district numbers about 1000, and include natives of England, Scotland, Ireland (very few), the Hebrides, and Canada, the half-breeds being

principally of Franco-Canadian origin. The pure French element is represented by fifteen Roman Catholic priests, and ten or twelve lay brothers.

The Indians number about 10,000, and are divided into three great branches, the Esquimaux who live to the north, the Algonquin who frequent the Peace and Athabasca Rivers, and the Dene-diniye, a large family which comprises the inhabitants of the Athabasca and Mackenzie districts, as well as of Alaska and British Columbia.

In concluding his paper M. Petitot refers in very grateful terms to the kind encouragement and support accorded to him and his fellow missionaries by the Hudson Bay Company.

THE UNITED STATES SURVEY IN THE SAN JUAN COUNTRY.*

THE San Juan country in the south-west angle of the State of Colorado, in which the United States Geological and Geographical Survey, under Dr. Hayden, was engaged during the season of 1874, is a region characterized by a complicated system of mountains (forming the western spurs of the Rocky Mountains), which appear not in a succession of ranges but in a great mass. The character of the volcanic rocks which compose them and extend for an area of more than 5500 square miles, from the San Luis Valley westward as far as the high masses of mountains and plateaux, is one of great interest to the geologist, as it demonstrates an enormous amount of activity during a probably short period of time, the sudden occurrence of rocks intimately associated with others entirely different being frequent.

The district is one of interest on account of its mineral resources, which comprise silver, gold, and other metals. Operations are carried on at several points in the vicinity, and on tributaries of the Animas River, but during the time of Dr. Hayden's visit comparatively little work was being done. The greater portion of the miners' time and energy was devoted to "prospecting," and but few had developed their lodes to any extent. One difficulty under which they laboured was the want of available capital, and of a place where the ore might readily be converted into cash.

Baker's Park, the centre of the great mining district in this region, is small in area, and would probably be disregarded if situated in other parts of Colorado, but surrounded as it is by the most rugged mountains in the territory, if not in the whole Rocky Mountains, this little area of plain land becomes an object of curiosity and interest. It is in reality nothing more than the bed of the deep cañon of the Animas River spread out at the lower end to a width of a mile or two. Its height above the sea is 9400 feet and as the passes leading into the valley range in height from 1300 to 3200 feet above it, a good notion of its seclusion may be formed. Here, in 1862, Baker and his little band were mercilessly driven by the Indians. How many fell in the massacre, how many starved or froze to death seems even yet to be veiled in mystery.

* Based on the official *Bulletins* published by the Department of the Interior, Washington.

But how the present survivors ever escaped might well remain a mystery when we consider the great depth of snow that must have covered the mountain passes, and that the country was then perfectly unknown.

The route of the surveyors lay from Colorado Springs over Ute Pass into South Park, thence down the Arkansas River and across the range at Pıncho Pass into the San Luis Valley, and from thence into the San Juan country. The character of the country, abounding in peaks from which fine views could be obtained, appears to have been very favourable for topographical delineations, but the detailed description thereof does not call for any extended notice. While engaged in taking observations from one of the peaks above 13,000 feet in height, Messrs. Wilson and Rhoda, two of the party, were very curiously affected by the electricity with which the air was charged. At first the presence of the electricity was manifested by a tickling sensation at the roots of the hair, but this soon increased, and a ticking sound ensued, accompanied by a peculiar sound described as "almost exactly like the frying of bacon." The clouds at this juncture were yet distant, but fast approaching, and as the force of the electricity increased one of the instruments commenced to click like a telegraphic machine, the clicks increasing till a musical sound was produced. A similar but finer sound was emitted by the pencils in the hands of the observers when the top was laid back so as to touch the hand. A sudden relief was brought about by the lightning striking a neighbouring peak, but shortly after the clouds began to ascend and approach their station, and the phenomena increased in force after each successive stroke of lightning. The barometer when taken out of its leathern case and held vertically gave forth such a terrible humming as to compel Mr. Rhoda to seek shelter between two rocks before venturing to return it to its case. Mr. Wilson was soon compelled to abandon his instrument, for it was also producing such a humming that, combined with the noises issuing from thousands of angular blocks of stone, the observers were almost distracted. A stroke of lightning suddenly brought relief, and Mr. Wilson made a dash for his instrument, but even then the tension was so powerful that he received a strong electric shock where the tripod came in contact with his shoulder. Both surveyors then made the best of their way down the mountain, and they had not got 30 feet from the summit when it was struck. On other occasions phenomena of a very similar character were experienced, but the surveyors took care not to expose themselves so freely to their influence.

Among the numerous peaks ascended by the topographers the Rio Grande Pyramid deserves mention. Its pyramidal form is almost perfect, there being enough bluff intermingling with the *débris* slopes to give relief. An ascent of it on foot was quite easy, and the party was enabled to reach the fine summit (13,773 feet).* The highest peak surmounted was Mount Wilson, and the ascent of this was exceedingly dangerous owing to its extreme steepness and to the presence of crevasses, precipices, and loose stones. From its summit, 14,280 feet † in height, a good *coup*

* All the heights were determined by barometer observations.
† Ibid.

d'œil of the drainage and topography could be obtained.

Mr. Rhoda, the topographer of the party, appears to have been much struck with the wild beauty of some of the peaks, and on one occasion, when the sudden appearance of a grizzly bear rudely dispelled the romance of the scene, he feelingly gave vent to his indignation as follows:—

“Of course in a climb as long and difficult as this, our instruments and books were all we cared about bringing with us, and for this reason our guns were left behind. We were much surprised to see an animal in this place. It is ever thus; when you feel you are treading a path never trod by a living thing before, if some such vile worldly thing as a cast-off paper collar or an empty whiskey-bottle does not intrude itself on the sight, some disgusting quadruped must needs break the precious solitude and scatter your airy castles to the winds. To show our utter disgust for all animate things that could not live below this altitude, we yelled and threw stones after the bear till he was finally lost to sight, far down the mountain side. In our hate we even wished he might have been in a position whence we could have rolled rocks down on him.”

Some peculiar forms of erosion are exhibited in Eastern Colorado in the case of some isolated castellated columns of sandstone, from 40 to 60 feet in height, which are remnants of beds that originally spread over a large area near the head of Monument Group. Further to the north, near the sources of Plum Creek, a branch of the South Platte River, there is a pretty full series of the sedimentary beds exposed by the upheaval of the mountains. For a distance of 20 miles there is a belt of country about half a mile in width, in which these eroded sandstones present great variety of forms, a result attributable to the great variety of the texture of the strata within a few feet. The irregular laminæ of deposition are quite remarkable, showing that the entire group of sediments was deposited in moving waters. Dr. Hayden remarks that the scenery along the base of the Colorado range (of which the district referred to forms part) will always be regarded with the greatest interest by tourists, as well as geologists, and has no parallel in any other country of which he has knowledge, either from personal examination or from the descriptions of other explorers.

As far as regards natural history, collections were made at nearly every camp on the whole route. Wild-fowl, such as geese, ducks, and gulls were common; only two species of crustacea, *Gammarus robustus*, and *Hyalala inermis* were seen; on the slopes of the Rocky Mountains antelopes, mountain sheep, and grizzly bears were found, the last having been met in the most inaccessible places imaginable. Some snakes and frogs were secured at Hot Springs, Middle Park; and south of the mountains lizards began to appear in great numbers and variety, and increased as the party got further out on to the dry plains. The largest part of the material brought home comprised land and freshwater shells, and of these a speciality was made.

STANLEY'S EXPLORATION OF THE VICTORIA NYANZA.

THE three letters recently published in the *Daily Telegraph* furnish a preliminary record of a most successful geographical exploration, which was carried on in spite of obstacles to which a traveller less determined than Mr. Stanley would have succumbed. We are supplied, for the first time, with authentic information respecting the configuration and extent of the Victoria Nyanza, and of its most considerable tributary river, the Shimiyu, which for the present must rank as the most southerly course of the Nile. The letters of Mr. Stanley are of a fragmentary nature, and his map, which may be inspected at the rooms of the Royal Geographical Society, is but a mere sketch. On his return he will no doubt furnish more ample information. Still, the results attained by him, as far as they have been communicated, are of such importance and interest that we feel sure our readers will be glad to find them embodied in the two maps accompanying the present number of the *Geographical Magazine*.

MPWAPWA TO THE LAKE.

From Mpwapwa, a village in Usagara, Mr. Stanley travelled through Northern Ugogo and the forest region of Mgunda Mkhali, leaving the residence of the vain chief of Mvumi far to the south. At Mzanza he appears to have struck his old track, when travelling to Ujiji, and to have continued along it as far as Mukonduku (2800 feet*). He then proceeded north, diverging occasionally to the west and north-west, and finally reached the lake at Kagehyi, by a route to the east of that followed by Speke, and bounded towards the east by the country of the predatory Wahumba or Masai.

The village of Mtivi (2825 feet) is stated to be 20 miles to the north of Mukonduku, but soon afterwards he ascended a plateau, over which he travelled during the remainder of his journey. The altitudes observed by him varied between 3800 and 5100 feet, and jungles of acacias covered nearly the whole country.

Having crossed the district of Usandawi, abounding in elephants, he reached Muhalala, a village of Uyanzi or Ukimbu.† There the guides whom he had engaged in Ugogo deserted, and although he succeeded in obtaining others, these likewise escaped at the end of the first day's journey, and left Stanley on the margin of a vast wilderness, covered with acacia jungle. The march through this was attended with much hardship, as no water could be found. Six men died, and when the caravan at last reached Uveriveri, a small village recently established on the southern confines of Urimi, the whole of his men were exhausted by hunger and fatigue. Supplies for so large a number could not be obtained from the four families inhabiting the village, and Stanley therefore picked out twenty of the strongest men, whom he despatched to Suna, a district 29 miles to the north-west, for a supply of grain. They succeeded in their mission, but during their absence two more men died.

The next day's journey led to the base of a rocky hill, overlooking an open plain of vast extent. On

* These altitudes are those given in Stanley's letters.

† We understand this to be a village in Uyanzi inhabited by Wakimbu.

the following day he reached Suna, the inhabitants of which struck Stanley as being a fine race of men. They wore no clothing, and even the women contented themselves with scanty goatskins. The chiefs reluctantly permitted the caravan to remain here some time, and consented to supply provisions. During the four days which the caravan stayed here six more men died, and Edward Pocock, one of Stanley's European servants, fell ill with typhus fever, to which he succumbed on the 17th January at Chiwyu, a village only a few miles to the north of Suna, and close to the water-parting which divides the waters flowing north to the Nyanza from those flowing south. This village, Stanley tells us, is 400 miles from the sea, and 320 miles from the Nyanza, and we judge from this that his further route must have been very circuitous.

In the district of Mangara, two days further north, Kaif Hallek, who had carried Kirk's letter-bag to Ujiji, was waylaid and murdered. This was the first act of hostility on the part of the natives.

On the 21st of January Stanley reached the village Vinyata, in the district of Ituru,* and in the valley of the Liwumba River. The latter is 20 feet wide and 2 feet deep during the dry season, but swells considerably after rains. All the rivers to the north of Chiwyu drain into it, and thus far it is the most southerly source of the Nile known. It flows towards the west, and where Stanley reached it, there were numerous villages surrounded by plantations, and having a population of from two to three thousand souls. The inhabitants received the strangers coldly, but after some time they consented to supply provisions, and even the medicine-man, who is treated with great deference, condescended to barter an ox for double its value in cloth and beads. The sight of Stanley's ample stores, however, roused their cupidity, and on the 23rd January they made an attack on the camp, which was promptly repulsed with a loss of fifteen men killed on the side of the enemy. Nothing daunted by this rough reception, the natives returned to the assault on the following day. Stanley sent out four parties with orders to destroy the villages and to seize the cattle. Stanley lost twenty-one men on that day, the enemy thirty-five. The fighting was renewed on the 25th, but the natives then retired from a conflict which had proved so disastrous to them, and early on the 26th Stanley struck his camp, and departed with a stock of provisions for six days. On the 28th he reached Mgongo Thembo in Iramba,† and here he mustered his people, and found that, out of 314 men with whom he had started from the coast, there only remained 194. No less than 120 had died from disease, had been killed, or had deserted.

The notes on the further progress to the lake are of a very fragmentary nature. North of Iramba Stanley crossed what was apparently an old lake basin, or an arm of the Nyanza, 40 miles in width, the altitude of which (3775 feet) he found to be but little more than that of the lake. The Luwamberri River flows through it, and after rains the whole of this extensive basin stands under water.

* Burton conjectures this to be identical with Utatura (see *Geographical Magazine* p. 354). In his *Lake Region*, p. 279, the Watura are said to inhabit the country between Tura and Usmao, and they are described as a "wild pastoral race."

† Iramba is referred to in Burton's *Lake Regions*, p. 164. It is stated to be 8 days' journey to the north of Tura, and 5 from Rubugo.

Having penetrated through the jungle bounding the western side of this basin, Stanley entered Usukuma, the first district of which is Mombiti. He describes Usukuma as a densely populated country abounding in cattle, and as consisting of a series of rolling plains intersected by ridges of hills. The Liwumba is called here Monungah, and Stanley travelled for many miles along its winding course.* The Luwamberri and Duma are its principal tributaries, and it enters the Nyanza under the name of Shimiyu. Having traversed Usiha, Mondo, Sengerema and Marya, districts of Usukuma, our traveller crossed Usmaow, and then returned into Usukuma, reaching the Nyanza on the 27th February, 1875, at Kagehyi, one of the principal ports resorted to by slave dealers, in the district of Uchambi. His caravan now numbered only 3 Europeans and 166 natives; 28 men had therefore died or deserted since he left Iramba.

At Kagehyi, which he states to be a few miles east of Speke's Muanza, Mr. Stanley read his aneroids and determined the boiling-point. From the latter the altitude of the lake has been computed by Captain George at 3808 feet, which does not differ materially from the result obtained in the same manner by Captain Speke, viz. 3740 feet. The aneroid observations, roughly computed by Stanley himself, give 3550 to 3675 feet.

CIRCUMNAVIGATION OF THE NYANZA.

Having launched the 'Lady Alice,' a light boat, which he had carried in pieces all the way from the coast, Mr. Stanley embarked on the 8th March, with a picked crew of eleven men and a guide, and circumnavigated the whole of the lake in fifty-eight days. He first explored a gulf at the south-eastern corner of the lake, which he named in honour of his predecessor, Speke. The districts of Sima and Magu are inhabited by tribes speaking the same language as the Wasukuma, but governed by independent chiefs. The Shimiyu River, which is 1 mile wide at its mouth, but soon contracts to 400 yards, separates Magu from Maganza, which, like the neighbouring Manasu, is a hilly country, but thinly inhabited, and the resort of elephant-hunters. The inhabitants of these two districts, as well as those of Ututwa, further east, speak a different language.† On reaching the bottom of the gulf the aspect of the country changes completely. A marshy plain extends far inland. It is traversed by the Ruana River, and inhabited by the Wiregedi, a savage tribe, hostile to strangers. On the north Speke Gulf is bounded by the hilly districts of Shashi, Uramba and Uirwi.‡ They are separated from each other by sterile plains, and a thin line of verdure extends only along the margin of the lake. These three districts appear to constitute continental Ukerewe, the island of the same name being separated from them by the Rugeshi Strait. Mr. Stanley circumnavigated it, and describes it as a verdant island, having bold coasts, and abounding in cattle and ivory. The king, Lukongeh, is an amiable man, and the inhabitants are an enterprising

* Stanley estimates the entire course of the Shimiyu at 370 miles.

† The Manasu people are called Wajika by the Ututwa, possibly Speke's Washaki, three marches east of Muanza.

‡ Thus spelt on Stanley's map. In his letters, as printed in the *Daily Telegraph* and *New York Herald*, we meet with five different readings, viz., Ururi, Uirur, Urima, Uirari and Uirwi.

people, who visit Ugeyeye, Usongara, and Uzuiza (Uzinza?) in their canoes. Many islands are tributary to it, the chief among them being Ukara, the inhabitants of which rejoice in charms and medicines. Others are Nifuah, Wezi, Irangara, and Kamasi. On reaching the northern end of Rugeshi Strait, Stanley had the Majita table mountains towards the north-east, rising boldly from the lake-shore to a height of 3000 feet, and bounded by extensive plains on the land side.

He then shaped his course towards the north, following the coast of Ururi, a level country, remarkable for its wealth in cattle.* The Shirati is the most important of its rivers. Having passed the wooded plains of Mohuru, Stanley found himself at the entrance of Kavirondo Bay, and had the bold mountain shore of Ugeyeya in front of him, which contrasted strikingly with the flat country towards the south. Ugeyeya is much resorted to by ivory and slave-hunters, and its timid inhabitants are preyed upon by their southern neighbours, the Waruri, by the Masai and by Arabs. Even whilst Stanley was on the lake one of the latter was building a dhow of twenty or thirty tons on Ukerewe Island, to enable him more vigorously to carry on the slave trade.

From the head of the Bay of Kavirondo the plains are said to extend for twenty-five days' march towards the east. Susa is a district of the Masai, fifteen days' in the same direction, where there are hills, which emit smoke and occasionally fire. The Gozi River, which flows into the bay, rises towards the north-east, near Kavi.†

From this bay Stanley sailed between the bold headland of Goshi and the elevated Ugingo Island, which afford shelter to the canoes of the natives, and reached Bridge Island,‡ thus called by him from a natural bridge of basalt, 20 or 30 feet long, and 12 or 15 feet wide. From the top of this island the view eastward is over the flat districts of Wasavi and Nakidimo, which are slightly wooded, and whose surface is varied by isolated conical hills.

On reaching Nakidimo Bay, Stanley attempted to enter into communications with the natives, but failed, and thence passed round into a larger bay, into which the waters of the Ugoweh River discharge themselves. Hippopotami abounded, and the 'Alice' avoided a hostile collision by speedily taking to flight. The villages along the coast of Mahata were more numerous, and the population more dense than at any other locality visited hitherto. Mr. Stanley attempted to land, but his intention was frustrated by the hostile attitude of the inhabitants, and he anchored during the night at an island.

Nduru, the next district towards the north, and the last in Ugeyeya, is called Baringo§ by the inhabitants of Uganda. It has a coast-line about 15 miles in ex-

tent, deeply indented, with several bays almost landlocked, and large islands close to the shore.*

Mr. Stanley thence sailed into a bay forming the north-eastern extremity of the lake. It is bounded on the east by the hilly country of Manyara or Unyara (the inhabitants of which speak a language kindred to that of Uganda,) on the west by Muchamba and Chaga, and Usuguru, a slug-like island, standing across its mouth, shuts it almost completely off from the main body of the lake. The country on the upper portion of this bay, Ugana, is flat, and the river Yagama enters it there. Mr. Stanley's map does not bear out the description of this bay which he gives in the letter written from M'tesa's capital. He there says that the island of Chaga runs directly north and south for 8 miles, at a distance of 12 miles from the coast of Unyara; that a narrow strait separates it from the island of Usuguru; and that the latter runs in a S.S.E. direction to within a distance of 6 miles from the eastern coast of the mainland. On our map we have indicated the features thus described by dotted lines, and the "lake of Baringo" (Bahari 'Ngo) would thus be connected with the main body of the lake by a narrow channel, as told by Speke.

Usoga extends from Chaga Island to the Napoleon Channel, and Mr. Stanley visited its coast districts Usowa (where his arrival was greeted by hostile demonstrations), Ugamba, Uvira, Usamu, and Utamba (Wantambi on map). Near the latter large islands again become frequent. On approaching Uvira, the most considerable amongst them, the natives, by a show of friendship, induced our explorer to approach close to the land, and then treacherously greeted him with a shower of "large rocks." Stanley retaliated by shooting a man with a revolver, and then proceeded up the channel which separates Uvuma from Bugeyeya. There, close to the shore of the former, he encountered thirteen canoes, carrying about a hundred warriors. This led to a fresh conflict, which ended in Stanley shooting three of his assailants, when they took to flight. He anchored at night in the channel, in lat. 33° 40' 15" E., long. 0° 30' 9" N. On the following morning he felt a current setting towards the north, and found himself in the Napoleon Channel, which separates Usoga from Uganda. He continued to within half a mile of the Ripon Falls, whose noise he heard distinctly. A few islets dot this channel, close in shore, and its entrance is closed by the larger islands of Uziri and Wanzi, which stretch obliquely towards Uvuma. Passing between the coast of Ikira (Kira) and the island Uziri, Stanley took his course towards the west, procuring a guide at Kiwa (*i.e.* island), halting at Kibibi Island, and then proceeding to Ukafu, a horseshoe-shaped bay, whence he despatched a messenger to M'tesa, to announce his arrival. Incidentally we are told that there is no river called Luajerri, or Luaserri, that word meaning merely "still water," and being applicable to any creek or inlet. Stanley himself discovered a crooked inlet named Mwaru Luaserri, near Murchison Bay, which extended for several miles inland. He says that the current there set alternately for two hours to the north, and then to the south, a phenomenon noticed in all the inlets on the coast of Uganda. On his map we find a "canal" laid down, which follows the direc-

* Mr. Stanley's map hardly bears out this description.

* He mentions the following districts as belonging to Ururi, viz., Wye, Irieni, Uriero, Igengi, Utiri, Shirati and Mohuru. Utiri (Thiri) is mentioned by Burton as a district between Urudi (Ururi) and Uhamba. The name "Usambara" appears only on the map. Majita, according to Burton, is inhabited by Makwiya (Wye?).

† Kavirondo is undoubtedly the same as Wakefield's Kavirond; Ugeyeye may be Ligeyo.

‡ He states the native name to be Kiwa, which is, however, merely the native word for island.

§ Baringo is mentioned by Krapf, Speke, Wakefield, and others.

tion of Speke's Luajerri, and connects the lake with the Nile. The greatest depth of the Nyanza thus far was found by Stanley to amount to 275 feet.*

At Beyal Island (Bellefonds of map?) Stanley was welcomed by a fleet of canoes sent by M'tesa, and on the 4th of April he landed at Usavara, a temporary residence of the king on Murchison Bay, where he stayed to shoot birds. Murchison Bay is described by Stanley as extending from lat. $0^{\circ} 15' N.$ to $0^{\circ} 27' N.$, and from long. $32^{\circ} 38'$ to $32^{\circ} 53' E.$ At its mouth it is 4 miles wide, but within it expands to a width of 12 miles, and the term "creek" can be applied only to its upper portion, between Dwaga and Mngongo. The present residence of M'tesa is called Ulagalla or Uragara. It stands on an eminence near the head of the bay, the royal palace occupying the centre, and seven broad avenues radiating from it. Bandaw, the old residence, where Speke and Grant visited the king, stands further west. During the Ramadan the king resides at Dwaga, on Murchison Bay.

Stanley speaks of the king in terms of the highest praise. His power, he tells us, extends to Uganda, Unyoro,† Usoga, Karague, and Usui, and a naval review, in which 84 canoes, manned in the aggregate by 2500 men, took part, gave him a favourable idea of his military resources. He is likewise stated to maintain a body-guard of 200 warriors. The king and all his officers now profess Islamism, and dress in Arab costume, but is nevertheless said to be anxious to receive Christian missionaries. There is now no daily butchery of men or women; seldom one suffers the extreme punishment.‡

At M'tesa's capital Mr. Stanley had the good fortune to meet with M. Linant de Bellefonds, one of Colonel Gordon's officers, to whom he entrusted a letter. This young officer, with 36 of his followers, was massacred by the Bari on his return to the north, and Stanley's letter was flung aside, but found afterwards by a detachment sent out by Colonel Gordon.

On the 17th April Stanley left Murchison Bay on his return to the south. The king had promised him an escort of 30 canoes, and ten of them accompanied him as far as the Katonga River, where their commander said he must go to Sasse to procure the remainder. The Katonga River is not very large, and has but one mouth. The Amionzi enters the lake about 8 miles to the W.S.W. of it.

Stanley being anxious to return to his camp at Kagehyi, and the Uganda chief not returning from Sasse, left the Katonga on or after the 20th of April, attended only by two boats. He tells us next to nothing as regards the remainder of his journey, but the nomenclature of his map (Battle Cove and Refuge Islands) points to a hostile conflict and to a fortunate escape after dire distress. Ugunga§ is said by him to

* On his MS. map there is a red circle to the S.S.E. of Murchison Bay, which may possibly indicate the spot at which he obtained this depth.

† A portion of Unyoro only has been incorporated with Uganda, and Kaba Rega, the king of that country, maintains an attitude of hostility towards Uganda, as well as towards Egypt.

‡ Colonel Long, who visited M'tesa in 1874, gives a very different account. On his first reception 30 men were decapitated, 8 to 10 on every subsequent one, and 7 to propitiate the evil spirits when he was about to cross the lake.

§ Ugunga is the trader's name for Unyoro, which encircles Uganda, and approaches the lake north of the Kagera or Kitangule.

extend to the Kagera or Kitangule River, and south of it he mentions the districts Usongara, Kamiru, Uwya and Uzinja (Uzinza), called Mweri by the Wanyamuezi. The latter extends to Jordan's Nullah, where Usukuma begins.*

On the 5th of May he was back at Kagehyi, and found that Frederick Baker, one of his European servants, had died on the 23rd of April. By this time Mr. Stanley has probably explored the south-western corner of the lake, and is on the way to the Mwutan N'zige or Albert Nyanza.

OUR MAP OF THE NYANZA

is principally based upon that of Mr. Stanley, which we have adjusted to the positions determined astronomically by Captain Speke, and to the accounts published by that traveller and by his companion Captain (now Colonel) Grant. Mr. Stanley has himself observed the latitude daily and the longitude on frequent occasions, but as the results, as far as they have been communicated, differ considerably from those of Speke, and will probably be modified considerably, on his register of observations being subjected to a rigid examination, we have thought it best to discard them for the present. If any justification for this course be required, we may refer to his own map, which has been drawn without reference to the positions determined by him. The following list of positions proves this:—

	Positions given in Stanley's Letters.		Stanley's Map.	
	Lat.	Long. E.	Lat.	Long. E.
Kagehyi	$2^{\circ} 31' S.$	$33^{\circ} 13'$	$2^{\circ} 16' S.$	$33^{\circ} 16'$
Shimiyn (mouth)... ..	$2^{\circ} 35'$	$33^{\circ} 33'$	$2^{\circ} 22'$	$33^{\circ} 33'$
Speke Gulf, E. extrem. —		$33^{\circ} 46'$	$2^{\circ} 10'$	$33^{\circ} 57'$
Rugeshi Strait	—	$33^{\circ} 26'$	$2^{\circ} 5'$	$33^{\circ} 30'$
Majita Bluff... ..	$1^{\circ} 50'$	$33^{\circ} 10'$	$1^{\circ} 55'$	$33^{\circ} 40'$
Nakidimo	—	$34^{\circ} 49'$	$0^{\circ} 3' N.$	$34^{\circ} 49'$
N.E. extremity of lake.	$0^{\circ} 34' N.$	$34^{\circ} 35'$	The same.	
Anch'rge in Uvuma str.	$0^{\circ} 30' N.$	$33^{\circ} 40'$	$0^{\circ} 35' N.$	$33^{\circ} 35'$
Ulagalla	$0^{\circ} 32' N.$	$32^{\circ} 50'$	$0^{\circ} 45' N.$	$32^{\circ} 57'$
Katonga River	$0^{\circ} 16' N.$	—	$0^{\circ} 23' N.$	$31^{\circ} 45'$

Taking Speke for our guide, the two crucial points of Stanley's whole work would be as follows, viz. :—

Kagehyi	lat. $2^{\circ} 22' S.$	long. $33^{\circ} 18' E.$
Ulagalla	" $0^{\circ} 22' N.$	" $32^{\circ} 47'$

These differences after all are but of small importance when dealing with countries so imperfectly known. Far greater was the difficulty of accommodating Stanley's delineation of the western coast of the lake to Speke's route, and especially to the fragmentary notes published by Colonel Grant. The latter reached M'tesa's capital from Karague by a route different from that of Captain Speke, upon whose maps his observations have found no place. From Grant's *A Walk Across Africa* we learn but little to be utilized in the construction of a map. Far more valuable are the bearings communicated by him in vol. xlii. of the *Journal of the Royal Geographical Society*. At Chango, the position of which we can fix from a bearing upon Mweruka, Grant saw Sasse (Sesseh) Island, and an uninhabited islet to the south of it. At Kyabogo, Sasse was only 5 miles distant, and this place must therefore be looked for near the channel separating that island from the mainland on Speke's map. Captain Grant places Kyaboga in latitude

* Usungara is mentioned by Colonel Grant under the name of Wuzungura; Uwya is evidently Grant's Uhia or Mohia, and Speke's Uhaiya; Kamiru may be Grant's Mira, and Bumbirch on Stanley's map is evidently Speke's Umbire.

36°

The Regions

OF THE

NILE

Explorations of
GRANT, BAKER, KEMP,
STANLEY, CAMERON,
AND OTHERS.
RAVENSTEIN.

Scale 1:4,000,000.

80 Miles.

— Stanley's Route
--- Col. Long, 1874.

L L A

Samburu
(Isamburu)

2°

0° 25' S., longitude 31° 35' E., but as there are two stages between it and Chango, we considered ourselves justified in shifting that place further to the east, and were thus able to reconcile Stanley with Grant, though not with Speke, who talks rather vaguely of "constantly coming in view of the lake" on the road to Ugonzi.

The area of the lake, as measured on our map, amounts to 25,300 square miles, including the islands, and to 23,900 square miles without them.

OUR MAP OF THE UPPER NILE REGIONS

is intended to show the position of the Victoria Nyanza with reference to the surrounding countries, and the valley of the Nile above Gondokoro. As far as the latter is concerned, we have adopted Speke's longitude for Gondokoro* (Ismailia), and Lieutenant Baker's longitude for Fatiko. The latter is deduced from two observations of eclipses of Jupiter's satellites (32° 37' E.). At Gondokoro Speke observed five lunar distances, the resulting longitudes varying between 31° 31' and 31° 59' E., the mean being 31° 46' E. Lieutenant Baker observed two lunar distances at the same place, his results differing to the extent of 1° 20'. Colonel Long's route to M'tesa's capital has been inserted from a rough sketch-map forwarded by General Stone, the chief of the Khedive's staff, but the maps of Baker and Speke still form the basis of our geographical knowledge of that part of Africa. Kemp's survey of the Nile up to Dufilé has been published in the *Proceedings of the Royal Geographical Society*, vol. xix., p. 325, and a map of Marno's route to the Makraka in the *Mittheilungen* of the Vienna Geographical Society, vol. xviii.

The stations at present occupied by Egyptian troops, as far as they appear on our map, are Lado, Wania, Regaf, Labore, Dufilé, Fatiko, and Fauera.

As regards the supposed connection between the Mwtan N'zige and the Tanganyika, our map sufficiently speaks for itself. The itinerary along the lake, communicated by Sir Samuel Baker, does not amount to much when weighed against the ocular evidence to the contrary brought forward by Livingstone and Speke.

The country between the Nyanza and the Snowy Mountains of Eastern Africa, has been delineated on our map, principally from the itineraries communicated by Wakefield. Several of the lakes, which hitherto enjoyed a separate existence on our maps have been swamped by the Nyanza as actually surveyed by Stanley. The terms lake of Ukerewe, Ukara and Baringo evidently refer to different portions of the same sheet of water. A detailed itinerary communicated by Rebmann, takes us to Burgenei, within eight days from the lake, and we are told that Wasambiro come to that place from the lake to sell their cattle to the traders. These Wasambiro we believe to be the inhabitants of Stanley's Usambara, and Erhardt's route, the most direct of all, would appear thus to lead to Ururi.† Taking Erhardt's route as a basis, no difficulty exists to lay down ap-

proximately the routes communicated by Wakefield, and embodied by Mr. Keith Johnston with his usual care in a map published in the *Journal of the Royal Geographical Society*. Kavirondo can easily be identified from Stanley's map, and Chamwale is mentioned by Livingstone, and placed by him to the east of the former, nor does the route to the Baringo offer much more difficulty. Wakefield's informant on going north, passed through the country of the Wa-Ligeyo (Stanley's Ugeyeya), on his return the Likamasia Mountains (Stanley's Kamasia). The Wa-Suku, a dreaded tribe, are the Wasoga, of whose hostile disposition Stanley had some experience, and the Nyarus River, recalls the name Manyara on Stanley's map. This river may possibly be the lower course of the Gwaso Nyiro, which has its sources on the snow-clad Kenya.

The only lakes in this eastern region, the existence of which may be assumed with some degree of confidence, are those of Samburu and Naivasha. The latter is of comparatively small extent, and its water is brackish. The Samburu, far to the north, appears to be more considerable. The road to it leads through Burkeneji (clearly Livingstone's Burukinegge, the "frontier land between Kavirondo and the Gallas"). Lake Ro has been identified by some authorities with the small lake in Arusha, whilst Manyara or Olmanyara has to be looked for in the north, in the country of the Manyara.*

E. G. RAVENSTEIN.

Reviews.

ULTIMA THULE.†

CAPTAIN BURTON, as usual, has gone to the root of his subject, and has treated it exhaustively. This publication on Iceland is not only an agreeable book of travels, but also a well-stored and judiciously arranged work, which will be of permanent value for future reference. In our number of *Ocean Highways* for October, 1872, p. 212, we furnished some account of Captain Burton's Icelandic tour. In his present work he gives not only a narrative of his travels, but also the results of his investigations and studies, and his matured views on the future prospects of the famous island and its people. He tells us that the main object of the book is to advocate the development of Iceland; and he holds three measures to be absolutely necessary. The first is the working of the sulphur deposits; the second is a systematic reform of the primitive means and appliances with which the islanders work in the fisheries; and the third is the extension of the emigrating movement, "now become a prime need, when the population is denser than at any period of its thousand year history."

* Whilst going through the press we received an advance sheet of the *Mittheilungen*, which contains an article on Stanley's Exploration by Dr. Behm. That geographer looks upon the Baringo as a distinct lake, and considers it just possible that the Mwtan, and with it the Nyanza, may have no connection with the Nile at all, but that the former may send an effluent towards the W. or S., in the direction of the Lualaba.

† *Ultima Thule, or a Summer in Iceland.* By Richard F. Burton, with historical introduction, maps, and illustrations. (2 vols., W. P. Nimmo, 1875.)

* The missionary Dovyak places Gondokoro in long. 31° 42' E. of Greenwich, but we do not know whether this is the result of actual observation.

† On Speke's first map Ururi is said to be an ivory port. On his subsequent maps this name has changed into Urudi and Urundi.

The introduction opens with a discussion on the locality of Ultima Thule according to Strabo, Pomponius Mela, Ptolemy, and other ancient writers; and on the etymology of the word. The second section of the introduction is devoted to the physical geography of Iceland under the heads of genesis and geology, orography, hydrography, and climate. In the hydrographic section Captain Burton makes some interesting remarks on the Gulf Stream discussions, and records observations by Captain Tvede, an intelligent and observant Dane, and by the author himself, the tendency of which are to show a capricious variation of sea temperature, and none of the regularity which might fairly be expected from a gulf stream.

The historical section is an admirable summary of the occupation, constitution, and literature of Old Iceland, including, however, some original research of considerable interest. The author specially breaks ground in a new field of enquiry respecting the older colonists of Iceland who preceded the Norwegians—Welsh, Hebridian, and Irish; and certainly succeeds in showing a case worthy of being taken in hand by future scholars.

The section on the political geography of Iceland contains detailed information respecting the divisions, judicial procedure, population, vital statistics, character and appearance of the Icelanders, their social condition, family relations, and diseases; and the following section is equally complete on the subject of education and professions. The last part of the introduction is devoted to a series of notes on the flora and fauna, the agriculture, fisheries, and other industries of Iceland, concluding with a section on taxation, weights and measures, coins, prices, and commerce. Captain Burton also gives a very complete and valuable catalogue-raisonné of modern books of Icelandic travel, and a list of maps and charts of Iceland.

The remainder of the work, including the last 112 pages of the first and nearly the whole of the second volume, contains the narrative of Captain Burton's own travels, commencing with his voyage in the steamship 'Queen,' which touched at the Orkney, Shetland, and Færoe Islands, before reaching Reykjavik. We have already described the routes taken by Captain Burton in his Icelandic travels, including excursions round Reykjavik; a visit to the harbour of Hafnaford, which will eventually be the place of export for the Krisuvik sulphur-fields; a voyage round the north cape of Iceland to the Skagafjord on the northern coast; a trip to Hekla and the Geysers; and a more extended journey over a wild portion of Eastern Iceland.

A valuable appendix on sulphur in Iceland materially increases the value of these volumes. It contains reports by several scientific men, including that of the Althing, and notes on sulphur in Sicily, Transylvania, and the Andaman Islands.

INDIA AND ITS NATIVE PRINCES. TRAVELS IN CENTRAL INDIA AND IN THE PRESIDENCIES OF BOMBAY AND BENGAL. By *Louis Rousselet*. (Chapman and Hall, 1875.)

THE work of M. Rousselet is magnificently illustrated, and is especially valuable as conveying a clear idea of Indian architecture, ancient and modern, and of Indian

scenery. The drawings are admirably executed and reproduced, and recur at almost every page, the work containing no less than 317 illustrations and 6 maps. M. Rousselet avoided the beaten tracks, his main object being to visit the courts of native princes, and the ruins of ancient temples and palaces. Thus he wandered from the dominions of the Gaikwar, through Rajputana, Central India, and Bandalkhand, meeting with cordial receptions, and learning much of the lives of the princes of India, and of the history and internal economy of their courts. We had one or two bald statements of our treaty relations with native states, and of the families and positions of their rulers, but there was, until now, no book which, in any adequate way, brought home to us the daily surroundings and habits of these princes. It is in fulfilling this object that the great value of M. Rousselet's splendid work consists.

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ELEMENTARY LESSONS ON BOTANICAL GEOGRAPHY. By *J. G. Baker, F.L.S.* (Lovell Reeve, 1875.)

THESE lessons are reprinted from the *Gardener's Chronicle*, and are intended for educational purposes, and to encourage the acquisition of comprehensive and correct ideas of the laws and leading facts of plant distribution. The first two chapters are on the way in which the heat of a place is influenced by its latitude, and the influence of the distribution of land and sea on the distribution of heat. This is illustrated by a table showing the monthly average temperatures at sea levels, in January and July, with the extreme range, at places in different latitudes; and the fourth chapter treats of the distribution of heat, as influenced by height above the sea. The remaining chapters treat of the botanical characteristics of zones of heat and moisture, and of the influence of man on the distribution of plants. Mr. Baker's little volume is likely to prove useful, and seems admirably calculated to stimulate enquiry, and to give rise to a desire for further investigation in the mind of the student.

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NOTICE SUR UNE CAUSE PROBABLE DU CHANGEMENT . . . DANS LE COURS DE L'AMOU-DARIA. Par *M. le Major du Génie Herbert Wood*. (Genève, 1875.)

LA QUESTION ARALO-CASPIENNE. Par *M. le Major du Génie Herbert Wood*. (Genève, 1875.)

IN the first of the above papers, which are presented to us in the form of a short pamphlet, Major Herbert Wood explains succinctly what, to his mind, may have occasioned the change of direction in the course of the Oxus, from the Caspian to the Aral. He commences by forming an estimate of the amount of water withdrawn from the Oxus for irrigation purposes in the Khanate of Khiva. Taking the observations made by the Russian Expedition in 1874 as a basis, he arrives at the conclusion that during July, August, and portions of June and September, the proportion of water drained off constitutes ten-nineteenths of the entire bulk of the Oxus. He then quotes a passage from Lyell's *Principles of Geology* demonstrating that the effect of a powerful current and a large body of water is to prevent the deposit of sand and other detritus, which a weaker current soon suffers to accumulate. In the case of the Oxus the volume of the stream in winter and summer is probably (to speak roughly) in the proportion of 1 to 3. Formerly the deposits made during the winter months were carried off by the more powerful current of the summer, but on the formation of the canals, the current was weakened in force, and the formation of sandbanks increased year by year. Thus gradually did obstructions arise in the old bed, and the waters at last sought a more rapid fall, towards the sea of Aral. Major Wood quotes the recorded experiences of Abul Ghazi (1605-1660) and

Jenkinson (1559), to prove that the change of direction in the course of the Oxus took place between 1500 and 1575. The theory here adduced by Major Wood appears to be corroborated by local traditions. In *Khiva and Turkistan*, translated by Captain H. Spalding (1874), p. 183, we read that all the traditions of the Khivese unanimously assert that the Amú formerly fell into the Caspian, and they account for the phenomenon of its change of direction by saying that Sultan Mahmoud commanded canals to be excavated on the right bank, and that as these increased in number and proportions, those on the left bank began to dry up, and the waters of the Amú were at last turned aside into its more northerly direction.

In the second paper, which was read before the Geographical Society of Geneva, the author contends with great force and precision for the existence in times past of a huge freshwater sea, which included the Black Sea, the Caspian and the Aral, as well as large tracts of the adjacent deserts, which even now bear traces of having been at one time covered by water. The Bosphorus, he is of opinion, was formed in the year 1529 B.C., by a cataclysm occasioned by a volcanic disturbance in the Cyanean Isles. The theory finds support in the configuration of the Caspian, and its eastward extension, as shown by the old geographers. Another interesting point deserving of enquiry is—Did the Caspian then extend as far as the Upper Tobol? If so, the expedition of Alexander the Great, and even that of the Argonauts, must be credited with having possessed correct knowledge of the geography of this great sea, which they joined with the Arctic Sea. Pomponius Mela says that the Caspian communicated with the Ocean by a long narrow channel, which widened out considerably to the south, and formed three great gulfs. Baron Heberstein, in his map of Russia, represents the Obi River as issuing from Lake Kitay which Jenkinson identifies with the Aral. Bergeron, in his travels, inserts a letter written to Mercator, informing him that one could pass by boat from Lake Kitay to the River Obi, and that on the former there were merchant ships manned by black men who had come by way of the Ardok or Oxus River. Other minor proofs of this interesting theory are cited by Major Wood, and we take the opportunity of adding one which, as a corroborative one, may appear of value, that is, that the fact of this great sea having had an outlet to the Arctic Ocean would satisfactorily account for the sweetness of its waters, which, since their isolation, so to speak, have become salt.

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ZWEITER JAHRESBERICHT DER GEOGRAPHISCHEN GESELLSCHAFT IN HAMBURG, 1874-75. (Hamburg 1875.)

The second annual report of the Hamburg Geographical Society, edited by Mr. Friedrichsen, forms a handsome volume of 286 pages, and is illustrated by a number of valuable maps. In addition to a report on the present position of the Society, which has 315 members, it contains several papers of interest. Mr. Friedrichsen reports on the remarkable stone ruins of Namantal, or Tonape, one of the Carolinas, which covers an area of 500,000 square yards. They were believed, at one time, to have been the work of Spanish pirates, but are now supposed to date back for centuries, and to be the only existing evidence of a race long extinct. The plans accompanying this paper are of great interest, and if Mr. Friedrichsen's conjectures are to be accepted, these ruins prove that neither subsidence or upheaval have been going on at this island for centuries. Dr. Cohen communicates a most valuable report on a route from Lydenburg to Delagoa Bay, illustrated by a geological map. Captain Schück contributes a paper on Ocean Highways available for sailing vessels, and Dr. G. Rohlf's an instructive essay on Barbary.

DIE ALTE GEOGRAPHIE ARABIENS. Von A. Sprenger. (Bern, 1875.)

Dr. A. SPRENGER'S work on the ancient geography of Arabia is a work of great learning, in which that scholar analyzes Ptolemy's geography, and illustrates and explains it by reference to other authorities. Biblical scholars will find much in his book to interest them, and the discussion on Ophir, in particular, sheds fresh light upon the much disputed identification of that locality, which Dr. Sprenger tells us can be looked for only in Southern Arabia.

Cartography.

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Walker's Map of Turkestan.*

COLONEL J. T. WALKER has brought out a new edition of his map of Turkestan, which contains a considerable amount of additional matter. He has availed himself to the fullest extent of the vantage ground which his position in India gives to him, and not only the results of the explorations of the Kasghar Mission will be found on this map, but likewise the recent routes of the Havildar, of the Mullah, and of another native explorer, who crossed the Tibetan highlands from west to east, from the Pangkong Lake to Lhasa. The latter terminates with the margin of the map, a considerable distance short of its terminal point. Colonel Walker has likewise improved the map in many other quarters, and the most recent Russian authorities have been consulted by him, and it conveys now a very fair notion of the geography of a considerable portion of Asia. The article by Captain Trotter, in our September number, contains an excellent account of the additions and rectifications contained in Colonel Walker's new edition.

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Maps of India.

AMONGST the last batch of maps received from India there are hardly any which call for particular notice, for most of them are new editions of old maps, or continuations of works the character of which has been dwelt upon by us on former occasions.

The Indian Atlas has nominally been increased to the extent of seven quarter-sheets. We say nominally, for two of them (2 S.E., 9 N.E., and 131 N.W.) are filled up only in part, whilst the remainder, though filled up, are still without hills. These sheets have been engraved in India, under the direction of Mr. Coard, by native artists, who prove themselves fully able to do that kind of work as well as it could be done in Europe.†

The sketch map of India‡ is merely a new edition of an old map, revised up to June 1874. A correct map of India, on the scale of this one (32 miles to the inch), is very much wanted, and if really based upon the surveys, as far as they exist, and compiled with care and judgment, it might be utilised for a variety of purposes. The map before us fails even in the object which it is intended to illustrate, viz. the political divisions of the country, and we are not able readily to trace upon it the

* Turkestan and the countries between the British and Russian Dominions in Asia, mapped on the basis of the surveys made by British and Russian officers up to 1875. Compiled under the orders of Colonel J. T. Walker, R.E., F.R.S. Scale 1 : 2,027,520. Dehra Doon, 1875.

† Indian Atlas, sheets 2 S.E., 2 N.E., 9 N.E., 34 S.E., 52 N.E., 93 N.E., 131 N.W.

‡ Sketch Map of India, showing Political and Revenue Divisions, corrected to June 1874. Scale 32 m. = 1 in. 6 sheets. Calcutta, 1874.

extent of the various feudatory states. Equally unsatisfactory is a sketch-map of the Lieutenant-Governorship of Bengal, drawn on the same scale.*

A new edition of the Punjab map,† in four sheets, has likewise been issued. This is one of the most useful and interesting maps published by the Surveyor-General, and it is printed in a somewhat luxurious style, which is not perhaps quite warranted by its technical execution. The additions, as far as we can see, are not of any importance, and the results of the explorations which have been embodied in the last edition of Colonel Walker's map of Turkistan, have not yet been inserted upon it.

Turning to maps on a larger scale, and beginning our review as usual with the Lower Provinces, we first meet with four new sheets of the map of Bengal,‡ on a scale of 8 miles to the inch. This, in its way, is a capital map, and sufficiently detailed for most purposes. We regret that it should not have been planned to include the whole of India, for these interminable maps of separate provinces lead to confusion and to a great waste of paper, as will readily be conceded when the immense blank spaces on some of the sheets are looked at. On the map before us the heights of the trigonometrical stations are given, but many more altitudes, from railway levellings and other sources, might no doubt have been inserted, and would have proved of interest.

The Revenue Survey map of the District of Bhagulpore§ has been increased by sheets 10 and 11, surveyed as long ago as 1846-50 by Captain W. Sherwill and Mr. J. Pemberton, but only now published, a delay fortunately very rare in India. The map will be completed in 17 or 18 sheets, of which Nos. 15, 16 and 17 remain to be published. The officers of the same survey have issued the six first sheets of a map of the district of Moorshedabad,|| which may be described as a revised edition of the Pergunnah map published on the same scale some years ago. The surveys date from the years 1852-55 and 1867-68, and were made by Capt. W. S. Sherwill and Lieut. W. J. Stewart.

The Revenue map of the District of Darjeeling, from surveys made by Messrs. E. T. S. Johnson, P. A. G. Cowley and assistants, in 1861-67, has been completed in 5 sheets.¶ The drawing strikes us as being rather too minute for the scale on which the photozincograph has been published, an error rendered more prominent by the hilly nature of the country. The Revenue map of the Kooch Behar State,** in 7 sheets, now likewise lies before us in its complete state. The surveys upon which it is based were carried on, under the supervision of Colonel D. G. Vanrenen, by Messrs. J. H. O'Donel, T. C. Moran, W. Lane, and G. H. O'Donel, in 1868-70. In addition to these 1-inch maps, the officers of the Revenue Survey have published a plan of the Chinsurah Cantonment,†† surveyed in 1869-70 by Capt. W. J. Stewart.

To the officers of the Assam Revenue Survey we are

* Sketch Map of the Provinces, comprising the Lieutenant-Governorship of Bengal; Provinces and District Divisions. Scale 32 m. = 1 in. Calcutta, 1872.

† The Punjab and its Dependencies, with portions of the North-West Provinces and Afghanistan. 20 m. = 1 in. Fifth edition, corrected up to 1875. Calcutta, 1875.

‡ Map of Bengal, 8 m. = 1 in., compiled from Revenue Surveys. Sheets 13, 15, 19, 20. Calcutta, 1875. (To be completed in 20 sheets, of which Nos. 8, 14, and 18 are not yet published.)

§ Lower Provinces Revenue Survey: District of Bhagulpore. Scale 1 m. = 1 in. Sheets 10 and 11. Calcutta, 1875.

|| Lower Provinces Revenue Survey: District of Moorshedabad. Scale 1 m. = 1 in. Sheets 1, 2, 3, 4, 6, and 9. Calcutta, 1875. Index map for do., scale 4 m. = 1 in.

¶ Lower Provinces Revenue Survey: District of Darjeeling. Scale 1 m. = 1 in. 5 sheets. Calcutta, 1874.

** Lower Provinces Revenue Survey: Kooch Behar State, 1868-70. Scale 1 m. = 1 in. 7 sheets. Calcutta, 1874.

†† Lower Provinces Revenue Survey: Chinsurah Cantonment and environs. 1 in. = 1 m. Calcutta, 1874.

indebted for a map of the District Nowgong,* surveyed in 1870-71 by Lieutenant D. C. Andrew, under the direction of Major G. Macdonald.

The publication of the Topographical Survey of Chota Nagpore is progressing steadily, and 54 out of a total of 75 sheets have now been published. Those mentioned below† are from surveys made in 1859-64 by Captain G. C. Depree and assistants. The two new sheets of the Ganjam and Orissa Survey‡ are by Captains G. H. Saxton and G. C. Depree.

We now pass over into the North-Western Provinces, and are called upon, first of all, to notice the progress of the Topographical map of Kumaon and Gurwhal,§ of which five new sheets have been published recently, leaving 18, out of a total of 37, for publication.

The officers of the North-West Provinces Revenue Survey have furnished 5 sheets of the maps of the districts of Bareilly|| and Bijnour.¶ The former is a new work, the sheets published being the result of surveys made in 1866-73 by Mr. J. Campbell. Lines of spirit-levelling and altitudes are inserted in red. The map of Bijnour has been completed by the publication of sheet 4, from surveys by Major A. D. Vanrenen.

The Punjab Revenue Survey is represented by an index map of the district of Dera Ghazi Khan,** which shows the districts, the roads, the principal towns and the trigonometrical points, and by the first 13 sheets of a 1-inch map of the state of Bhawalpoor.††

These latter are surveyed by Mr. E. T. S. Johnson, Captain D. C. Andrew and Mr. J. Campbell. There now remain only to be noticed the plans of four towns or cantonments, the titles of which are given below.‡‡ The plans of Erinpora and Nyanagar were surveyed by Captain George Strahan; that of Goona by Captain T. Holdich, and that of Rajkot by Captain A. Pullen.

We have on many occasions drawn attention to the revenue surveys of India, to the excellent and expeditious manner in which they are being carried on, and to the great benefits which are conferred by them upon the country. It is therefore with regret that we announce that the cadastral surveys in the North-West Provinces will be discontinued for the present. The money is wanted elsewhere, and the Indian government finds itself unable to continue these inquiries into the extent and value of its estates, and by doing so, surrenders nearly every chance of improving them. Let no one say that the work may be resumed when the finances of the country are in a more favourable position! A staff, like that now at the command of Colonel Thuillier, is not the creation of a day, and once dispersed, the work of organization will have to begin anew.

E. G. RAVENSTEIN.

* Assam Revenue Survey: District of Nowgong. Scale 1 m. = 1 in. 13 sheets. Calcutta, 1875.

† Chota Nagpore Topographical Survey, Sheets 1, 5, 6, 9, 10, 15, and 23. Calcutta, 1874.

‡ Ganjam and Orissa Topographical Survey. Scale 1 m. = 1 in. Sheets 40 and 70 (old series). Calcutta, 1875.

§ Kumaon and Gurwhal Survey. Scale 1 m. = 1 in. Sheets 7, 13, 35, 36, 37. Calcutta, 1875.

|| North-West Provinces Revenue Survey: District of Bareilly. Sheets 3, 5, 9, and 11. Calcutta, 1875.

¶ North-West Provinces Revenue Survey: District of Bijnour. 7 sheets. Scale 1 m. = 1 in. Calcutta, 1875.

** Punjab Revenue Survey: District of Dera Ghazi Khan, Index map. Scale 8 m. = 1 in. Calcutta, 1875.

†† Bhawalpoor State, 1869-75. [Scale 1 m. = 1 in. Sheets 1-9, 12, 13, 14, and 19. Calcutta, 1875.]

‡‡ Cantonment of Erinpora in Rajputana (Serohi), 1873. Scale 6 in. = 1 m. Calcutta, 1875.

City of Nyanagar in Rajputana (Maiwara), 1874. Scale 6 in. = 1 m. Calcutta, 1875.

Gwalior and Central India Topographical Survey: Plan of the City and Cantonment of Goona. Scale 8 in. = 1 m. Calcutta, 1875.

Kattywar Topographical Survey: The Town and Cantonment of Rajkot. Scale 12 in. = 1 m. Calcutta, 1875.

Log Book.

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An Arctic Fossil Saurian.—When the late Admiral Sherard Osborn made his long Arctic journey, in 1853, from Northumberland Inlet to Melville Island, he picked up a fossil under Mount Rendezvous, at the extreme north-west point of Bathurst Island. It was 150 feet above the sea, and in a carboniferous limestone formation. Admiral Osborn, on his return, gave the specimen to Mr. Salter, who handed it on to Dr. Carte of the Dublin Museum, who has only recently placed it in the hands of Mr. A. Leith Adams for description. The specimen is that of a vertebra, probably one of the middle cervical vertebræ of a saurian about 12 feet long; and Mr. Leith Adams has very appropriately named this new Arctic lizard, *Arcto-saurus Osborni*.

Dutch Geographical Enterprise.—There will be a meeting of the Dutch Geographical Society at Amsterdam on the 4th of December, which will be occupied in considering the subject of equipping a Sumatra exploring expedition by private subscriptions. If this succeeds, then attention will probably be turned to Arctic exploration. The letters from Lieutenant Beynan (who accompanied Captain Allen Young in the 'Pandora') to Commodore Jansen, have been published in Holland, and have made a very favourable impression on the public. They have roused the slumbering energies of one ancient whaling city, Enkhuizen, where a section of the Geographical Society has been started to renew the old whaling enterprises and voyages for Polar discovery. This is the first expression of a gradual movement in the right direction. The Dutch are slow in getting under weigh, but when once in motion they steadily persevere; and all genuine lovers of geographical research in this country will watch such movements as this which has been commenced at Enkhuizen, with cordial and friendly interest.

Storage of Water in Peru.—A speculating clique has, for its own purposes, been busily engaged in calumniating the Peruvian nation in order to bring down its securities. Two things are, however, certain, namely that the money lent to Peru is lent on substantial security, and that it has been spent on works of great public utility. Among these are the dams constructed near the snow-line of the maritime cordillera of the Andes, at the sources of the Rimac, in order to augment the supply of water at Lima during the summer months. These grand works, designed by Señor Derteano, have now been completed, and the water which will thus be stored, and prevented from running to waste during the winter, amounts to 30,000,000 cubic metres. The works have recently been visited and approved by Señor Garcia y Garcia, the able diplomatist and negotiator of the treaty between Peru and China, who is now Minister of the Interior.

Among other great Peruvian public works, recently constructed, are the mole and harbour at Callao (see our number for June 1875, p. 185), and the railways, described in our number for June 1874, p. 89. The substantial securities for the regular payment of interest on the debt are the guano deposits, which are described in our number for Dec. 1874, p. 370.

French Missionaries in Indo-China.—The Abbé Desgodins has sent home to the Paris Geographical Society a map of a portion of Indo-China where the frontiers of Tibet, Burma, Yunnan, and Patang march together. Of this country we know little beyond what Mr. T. T. Cooper has told us in the record of his attempt to penetrate into India, from the side of China. Some interesting information respecting the semi-independent tribes in the south of the tract referred to has been already given us by Father Desgodins, and will be found in our October number: on the present occasion we are also presented, in the October *Bulletin* of the Society, with an itinerary (dated November, 1873), from Yerkalo to Tseku. Father Desgodins' notes are very brief, owing to the fact that he was hurrying away from Chinese persecution at Yerkalo, and seeking an asylum with two brother missionaries at Tseku. He mentions one fact of interest, that the frontier line between Yunnan and the territory of Patang (which we presume he would include as part of Szechuan) is not where the late Francis Garnier placed it, close to the village of Laluka, and in about 28 N. latitude, but a whole degree further north, being only three hours' journey S.S.E. of Yerkalo. For further details we would refer our readers to the map itself, which will prove of value in the construction of future maps of Indo-China, inasmuch as some of the chief places have, on the strength of recent observations made by Father Desgodins, quite a new position assigned to them.

Yemen.—A letter in the *Basiret* complains seriously about the manner in which the Turks govern that recently annexed territory. Nothing is done to introduce education or to improve schools; various tribes have been driven to revolt, in consequence of maladministration, and at this very time a revolted district is being punished. There is some talk about conquering the districts of Sade, Yam, and Marib, but it is believed that they would submit voluntarily if they saw the rest of the country prosperous and contented. No less than 900,000*l.* have been levied in taxes during the last four years, but not a penny of this large sum has been devoted to the development of the resources of the country.

Strabo's Geography.—F. Giuseppe Cozza has discovered fragments of the 8th and 9th books of Strabo's geography at the Abbey Grotta Ferrata, near Frascati. There are known to be in existence 28 manuscripts of this geography, the oldest dating back to the 12th century. The fragment now discovered is apparently several centuries older, and is all the more valuable as the 8th and 9th books have been known hitherto only from very defective copies.

A New Geographical Paper.—M. Vion, the director of a school at Amiens, and inventor of a universal language (*Système uniphonographique*) proposes to start a polyglot geographical paper.

Professor G. Bühler has started on a new tour of investigation and is now in Kashmir. Later on he will visit Jamû, Rajputana and Malwa. We are glad to say that he has already had signal success. He has found the Sutras of Lanjâkshi to the Kâthaka Sakha, with a commentary, also a great deal of profane literature. A Rigveda with a hitherto unknown

accentuation has turned up, as well as parts of the Kâthaka, of which only one manuscript, the one at Berlin, has hitherto been known. The Rigveda manuscript is handsomely written on Bhûrja in Sharada letters, and therefore inaccessible to the majority of Sanskritists. It is considered to be from 400 to 500 years old.

Professor Bühler has made a new collation of the Tarangini, which has supplied about 1600 emendations of the Calcutta and Troyer Texts. Inscriptions and coins have also been found and the Pundits have helped Professor Bühler to identify many places, hitherto not determined at all, or determined falsely. A new translation of the work may be expected from Professor Bühler.

Correspondence.

NOTES ON KARA KHITAI.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

DEAR SIR,—The empire of Kara Khitai fills a notable place in the history of Central Asia in the century preceding the conquests of Jingis Khan. Like the empire of Jingis himself, it forms a centre about which we may integrate our facts, and gives us a broad canvas on which to fill in the details of that most crooked of histories, namely, the story of the revolutions of power among the Turks and other nomads in the earlier middle ages. In my last letter I attempted to fix the site of its capital Balasaghun; I should now like, with your permission, to collect some widely-scattered facts about some other cities within its borders, and also about some of the tribes which inhabited it.

I would begin with a notice which I have lately met with in Visdelou, showing that the capital of the Khan of the Western Turks was where I placed it in my former letter. Speaking of Tum-che-hu-Khant, the chief of these Turks in the early part of the 7th century, Visdelou says (apparently translating from the Chinese): "He moved his court to the north of the kingdom of Che (or, perhaps, Chach) to a place called in Chinese Tsien Tsuen, or the thousand sources."—(Visdelou Supplement to D'Herbelot's *Bibliothèque Orientale*, 110). This is surely no other place than the Ming-bulak or Ben-gheul I named in my former letter. I may add that in Dr. Bretschneider's admirable treatise on *Medieval Chinese Travels in the West*, he places the capital of Kara Khitai on the Chu. The most important town within the borders of Kara Khitai after its capital, Balasaghun, was undoubtedly Almaligh, the site of which may be considered fixed. Colonel Yule has discussed the question with his usual skill and clearness in *Cathay and the Way Thither*, ccxiii., note.

The following notice, which is a valuable supplement to his remarks, is taken from the narrative of the Chinese traveller K'hieon, surnamed Chan Chung, in the beginning of the 12th century, and was translated by M. Pauthier.—*Journ. Asiat.*, 6 ser. 9, 39. He says: "At length they arrived at the fortified town of A-li-ma, where reigned the King Pu-su-man. They lived in the 'Gardens of the Trees of the West.' The people of the West call this fruit Alima, whence the name of the town." This is literally true; the town took its name from its apple orchards, and "the trees of the West" are our apple-trees. The Chinese editor of the work adds the following valuable note:—"The great river which flows from east to west is now called the River A-li-ma-tu. A-li-ma in the history of the Yuen (*i.e.*, of the Mongols) is written A-li-ma-li. It is the fortified town of Ili. . . . The writers of the Thang dynasty call it Ili, in this following the official history of the Thang, which gave it this name from the River I-lih."

This confirms the remarks of Colonel Yule and others, and makes it pretty certain that Almaligh was, in fact, situated on the site of the Chinese town of Ili, the Kuldja of our maps. Now, as Balasaghun was the capital of an ancient Turkish principality, so was Almaligh of another. On turning to Raschid's account of the Karluks, we find him stating that Almaligh was their capital (*Erdmann's Temujin*, 246). Dr. Bretschneider says, that on an ancient Chinese map he has the Ko-z-lu-ye (*i.e.*, the Karluks are marked N.E. of Alimali). Erdmann tells us that Arslan Khan was their chief, who submitted to Jingis Khan, and gives us the names of his two successors. His grandson, Arslan Khan, married a daughter of Juji, the eldest son of Jingis.

Now, these Arslans Khans of the Karluks are no others, as I have stated in my previous letter, than the Lion Khans of Kashgar, who were the dominant Turks of Central Asia in the 10th century. They remained so, as I believe, until the time of the foundation of the empire of Kara Khitai, and their chief towns were Almaligh and Kashgar, which, curiously enough, upon the Mongol conquests, became the chief towns of the khanate of Jagatai.

In regard to the etymology of the name Karluk, upon which I asked for some information in my previous letter, I find that Abulghazi writes it Karlik, and says it means "a man of the snows" (*Abulghazi ed Desmaisons*, 20). The mountains south of Khotan are called Kharli Tau, which doubtless means "the snowy mountains." Their name is therefore probably equivalent to mountaineers, men of the snowy peaks. It seems quite clear that I was wrong in following Von Hammer in connecting their name with Kayalik, as, in fact, Colonel Yule had already warned me.

The position of Kayalik is a by no means easy question to decide. Let me premise by saying that both in Raschid and in the *Tabakat-i-Nasiri* the name occurs in the form Kabalik (*Erdmann's Temujin*, 336; *Tabakat-i-Nasiri* by Raverty, 154). This is no doubt a similar word to Bish-balig, and compounded of the well-known Turkish particle baligh or town, and of another particle Ka. In regard to this other particle I am going to make a bold guess, and to suppose that it may stand for Ko or Go. R and G are often interchanged as we find in Kadr Khan and Kur Khan, a form of Gur Khan, &c. If we may be allowed to make this alteration, the name would then stand Go-balig, *i.e.* Beautiful City. Now there is no trace of the name of Kayalik, so far as I know, before the foundation of the empire of Kara Khitai, and it seems to me to have been a city or town of their foundation. D'Ohsson for a long time misled me, as he may have misled others, by speaking of an independent prince of Cayalik named Ozar; but on comparing his account with the original account in Baschid, as given by Erdmann, it will be seen that he has blundered, and has created a prince of Kayalik out of the son of the prince of Almaligh (D'Ohsson, i., 111; Erdmann, 246). The fact is, there was no independent prince there so far as we know, and it was immediately under the authority of the Gurkhan. On looking over the map in search of a town with a name like Kabalik we shall very soon come across the Russian station of Kopal, which is surely the very same name. Now on turning to the discussion on the site of Kayalik raised by Colonel Yule, in *Cathay and the Way Thither*, we find him deciding from a correlation of the fragmentary evidence that it was some distance north of the Ili, four days' journey from the Alakul Lake, and he adds *it may be placed near the modern Russian station of Kopal*. This accumulation of evidence makes it very nearly certain that Kopal is in fact the site of the ancient Kayalik.

Another city of Kara Khitai was Imil, which was in fact the first settlement made by Yelü Taishi, the founder of the Empire (Juveni D'Ohsson i., 442). Carpini mentions it under the name of Omil, and tells us

it was originally built by the Kara Khitai (D'Avezac, 751). He elsewhere says that Ogotai, the son and successor of Jingis, built a town called Omil, in the land of the Kara Khitai (*id.* 648). Ogotai was a famous restorer, and this was no doubt one of his restorations, the city built by Yeliu Taishi having probably gone to ruin like the old capital of the Uighurs in the East, Karakorum, which he also restored (*id.* 516). Imil then became the capital of his ulus, or special appanage; and he and his son Kuyuk are described as returning home when they turned their steps towards Imil (D'Ohsson *passim*).

In the Yuan Shi Annals under the year 1252, it is said that the Emperor Mangu ordered the princes to return to their proper homes. Haidu, *i. e.* Kaidu, the son of Kuyuk Khan, and grandson of Ogotai, and the great rival of Khubilai, was sent to Hui-ya-li, *i. e.* Kayalik and Toto, another grandson of Ogotai, was sent to Ye-mi-li, *i. e.* Emil (Bretschneider *op. cit.* 70, note 39). Carpini tells us the emperor (*i. e.* the Mongol Khan Ogotai or Kuyuk) had a house there, to which he himself was invited as he passed that way, and where he was introduced to two of the emperor's sons (D'Avezac 751). The site of Emil we may fix with tolerable certainty. All the facts point conclusively to its having been situated in the valley of the river Imil or Emil, where Bretschneider was told by the Russian Captain Matussofsky that the ruins of an ancient city still exist. The same author tells us that on an old Chinese map of Central Asia, a place Ye-me-chi is marked north-east of Almaligh (*op. cit.* 70).

Carpini places his Omil near the lake with the boisterous wind, which has been shown by Colonel Yule and others to be the Alakul Lake; while in the travels of Changti we are told that after leaving the Kizilbash or Ulungar Lake, and travelling westwards, he reached a city called Yeman, which Dr. Bretschneider identifies with every probability with Imil. From these various facts we may conclude with confidence that it was situated somewhere in the valley of the Imil, and very probably, as has been suggested, where Khuguchak or Tarbogatai now stands.

Between Imil and Almaligh was a route much frequented in mediæval times, and we are able to trace it with considerable detail. The traveller Changti tells us that south-west of Ye-man (*i. e.* Emil) he reached the city of Bolo, which is undoubtedly the Borotalas or Green Plain of the maps, which does lie to the south-west of Tarbogati. It is placed between Imishi, *i. e.* Imil and Alimali, *i. e.*, Almaligh, in the Chinese map quoted by Dr. Bretschneider, and it is the Pulad of Raschid (Bretschneider, *op. cit.* 70). To the north of this town he passed the Hai-tie Mountain, which, I believe, with Colonel Yule, is simply the Alla Tau Range, which is, in fact, just to the north of Borotalas. Klaproth abstracts from Raschid an account of the defeat sustained by Arikbuka Khubilai's brother at the hands of Algu, which took place near the city of Pulad and the Lake Sout (Klaproth *Nouv. Journ. Asiat.* 283, Bretschneider *op. cit.* 70). The same author tells us that Sout-kul or Milk Lake is the name by which the neighbouring Kirghises still know the lake of Sairam, which is south of Borotalas, and close to it. The Mongols call it Chagan Sairim Nur, the White Lake of Peace (Klaproth *op. cit.* 282, note). It is, again, undoubtedly the Heavenly Lake of Chang Chun, which he describes as a splendid lake of about 200 *li* in circumference, enclosed on all sides by snow-topped peaks, which were reflected in the water. It is also mentioned in the *Si-yu-lu* as being situated on the top of the Yui Shan Mountains (*i. e.* the Talke or Borokoro Chain) and as being 70 or 80 *li* in circumference (Bretschneider, 32 and 114). Mr. Dilke, who has visited it, has described the same lake in your pages, and I take the liberty of putting his account by the side of those of the Chinese travellers. Speaking of Kuldja, he says, "in the mountains to the north is situated the lovely lake of Sairam Nor, at a height of 8000 feet, surrounded by snowy mountains and little

plains and valleys, covered in summer with Kirghiz flocks" (*Ocean Highways*, 282). South of the lake, according to the *Si-yu-lu*, the land is overgrown with lin-kin trees, which form such dense forests that the sunbeams cannot penetrate (Bretschneider 114). Chang Chung says:—"Following the shore [of the lake] we descended in a southern direction and on either side saw nothing but perpendicular cliffs and rugged peaks. The mountains were covered to their summits with dense forests, consisting of birches and pines more than 100 feet high."

This rugged pass is, no doubt, the defile mentioned by Changti, under the name of Tie-mu-r-ts-an-cha. Timur means "iron" in Turkish, and the pass of Talki from Lake Sairam to Almaligh was known in the middle ages as the "iron gate" (*id.* 71, note).

From Almaligh there were apparently two routes to the west—one along the banks of the River Ili, past Almatu, which is coupled by Baber with Almaligh, both being mentioned in his memoirs as having been destroyed before his time. This, as Dr. Bretschneider has shown (*op. cit.* 33), was clearly the Russian fort of Wernoye, which is still called Alimatu by the Chinese. According to Semenof's map it is situated on a feeder of the Keskelén. A main head stream of the river Ili, is called the Little Almaty, another feeder of the same stream, is also called Almaty, and both spring from the flanks of a peak of the Alatau Range called Almaty (Petermann's *Mittheilungen*, ix. 351). This was probably the route followed by the Armenian Prince Haithon on his journey westward. He tells us that having passed the Sout-kul, *i. e.* the Sairam Lake, he arrived at Hainalekh, which is doubtless Almaligh, as Klaproth suggests: he then arrived at Ilan-balig, and afterwards passed the Ilan-su. Ilan-balig means "city of serpents," and Ilan-su "river of serpents." Klaproth identifies the latter with Ilan-bach-su, or "the river of the serpent's head," which, he says, is an affluent of the Chu on its left bank (*Nouv. Journ. Asiat.*, xii. 283, note 2). I can find no such stream mentioned in the maps before me, and am disposed to think that by Ilan-su the Chu is meant, and that the city of serpents is the Equius or Balasaghun already discussed. Having crossed the Ilan-su, Haithon traversed a branch of the Thoros or Taurus Mountains, and arrived at Talas. There was a second route from Almaligh to Transoxiana, which was adopted by the Chinese traveller Chang Chun, but I cannot, after some effort, trace his itinerary, nor am I at all satisfied with the notes upon it by M. Pauthier and Dr. Bretschneider. With our present materials it seems utterly unintelligible. Nor can I identify the town of Chumir, south of Almaligh, mentioned in the narrative of Chang-ti (Bretschneider, 72), unless it be the submerged town at the western end of the Issikul Lake mentioned by Semenof (Petermann's *Mittheilungen*, ix. 360). We have now very cursorily surveyed the main topographical points within the borders of the ancient empire of Kara Khitai. The boundaries of the country, properly so-called, may be roughly fixed at the Balkhash Lake on the north-west. The steppe of Bedpal Talas on the west, the Jaxartes on the south, the Tarbagatai Chain on the north, and the 82nd meridian on the east. This was probably also the special ulus or khanate of Ogotai and his family. Beyond these limits the Kara Khitai no doubt exercised the authority of suzerains over the Kankalis in the west, the Naimans and Kirghises in the north, the khanate of Samarkand in the south, and those of Almaligh and Bishbaligh in the east.

I remain, yours, &c.,

HENRY H. HOWORTH.

DERBY HOUSE, ECCLES.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 15th November, 1875.

PRESIDENT'S ADDRESS.

THE President, SIR HENRY RAWLINSON, observed that the forty-sixth session opened under most favourable auspices, the list of new Fellows and candidates being the largest the Society had ever known. During the last twenty years the number of Fellows had risen from 1000 to 3000. Nor had there been any diminution of its influence and reputation. During the past year the Society had made itself felt in various ways. They had the proud satisfaction of knowing that it was owing to their persistent and well-argued advocacy that the Government became convinced of the desirability of sending forth an Arctic Expedition—a conviction which the Prime Minister first communicated to the public through the President of the Society. On another recent occasion they succeeded in persuading the Government, at the last moment, to send a Commissioner to the Geographical Exhibition at Paris, an evil of some magnitude being thus avoided, for there can be no doubt that we should have suffered both in reputation and material interest if, of all the powers of Europe, England had been alone unrepresented at this great international gathering.

Sir Henry next briefly referred to the proceedings of the geographical section of the British Association at Bristol. After reviewing most of the geographical events which had taken place during the recess, he said:—

Equatorial Africa, to which the attention of geographers for so long a period has been prominently directed, again comes to the front as the scene of the most interesting and important exploration of the year. In my Anniversary Address of last May, I ventured to anticipate, from Mr. Stanley's well-known intrepidity and determination, that, being once launched into the interior of Africa, with means and appliances of the most extensive and efficient character, it would not be long before he had resolved the doubts which have existed since the first discovery of the Victoria Nyanza as to the true nature of that great Nile reservoir—that is, as to whether it was one large sea studded with islands, as maintained by the first discoverers, Captain Speke and Colonel Grant, or whether it was a mere collection of lagoons, as suggested by Captain Burton and Dr. Livingstone, on the strength of native information. This anticipation has now been realised, and I am enabled, through the kindness of the proprietors of *The Daily Telegraph* and *New York Herald*, to exhibit to this evening's meeting a complete chart of the lake, as delineated by Mr. Stanley, who for the first time has almost circumnavigated its shores. The narrative of Mr. Stanley's cruise round the northern and western shores of the lake, which was intrusted to M. Linant de Bellefonds, whom he met at M'tesa's capital on a mission from Colonel Gordon, was published only this morning in the columns of *The Daily Telegraph*. The other letters, however, despatched *via* Zanzibar, and published some weeks ago, have acquainted us with all the main features of this most remarkable journey.

Sir Henry then gave a *résumé* of Mr. Stanley's explorations, which will be found fully dealt with in our present number. He then continued:—

Mr. Stanley intended, after completing his survey of the Victoria Nyanza, to cross the intervening country to the Albert Nyanza, where he hoped, by means of the 'Lady Alice,' to make a second voyage of discovery round this hitherto almost unvisited lake; but more recent intelligence from the Upper Nile leads us to expect that he will have been anticipated in this second

achievement by Colonel Gordon, or by some officers of the Upper Nile command, as it appears that a steamer has at length forced its way to a point above the principal rapids, from whence the passage to the Albert Nyanza is tolerably free from impediment. This important news is contained in telegrams of two different dates in August, sent by Colonel Gordon to General Stone, Chief of the General Staff at Cairo, and as an inaccurate *résumé* of their contents only has yet been published in England, I am glad on the present occasion to have the opportunity of reading to you the text of the documents, from copies which have been sent to me from Egypt by Sir Bartle Frere.

(1.) *Telegram of August 14th, 1875.*—The Arabic text of the telegram is very confused, but the contents appear to me to be as follows: "We are arrived near to Appudo. They tell us that the river is navigable from here to the mouth of the Asua. In ascending the river from Kerrie to this place we have passed two rapids. The steamer 'Khedive' has succeeded in passing the rapids of Beddin and in reaching Kerrie. This vessel will soon arrive here, that is, at Appudo. The force of the current here is very great."

(2.) *Telegram of August 20th.*—"At this date we are in the province of Appudo, with officers and soldiers of Makedi. Some soldiers from the south have unexpectedly arrived, and have been added to those coming from the north. The Governor of Fatiko has written me a letter, in which he informs me that Kaba Rega has been intriguing among the Dongolawa irregulars, and inciting them to evil actions. M. Linant has arrived with his soldiers in good health. The Governor promises to write the necessary letters. M. Linant had met with Mr. Stanley at M'tesa's capital. Mr. Stanley stated that Lake Victoria Nyanza is very large, and contains many islands. He had navigated the lake from south to north, being quite alone, *i.e.*, without being accompanied by any European. Lieutenant Cameron was eight months previously on the banks of Lake Tanganyika, and desires to proceed towards the west. M. Linant had a fight on the road between M'tesa's capital and Kilware with Kaba Rega's people, near the place where Colonel Long had his battle. Mr. Stanley, having already seen the country on the east of Lake Victoria, desires now to pursue his explorations to the west. Communication between Ugandi, M'tesa's country, and Zanzibar, which had been open, is now impossible, owing to the hostility of the Karagwé tribes."

These brief telegrams are not very clear of themselves, as telegrams rarely are, but, read by the light of Colonel Gordon's letters, written during the months of May and June (and which have been published in Paris), supplemented by Lieutenant Chippendall's report of his exploration up the Nile, which was read at the Bristol meeting, they become sufficiently intelligible. Colonel Gordon appears, during the summer, to have forced his way, in Nile boats, or nuggurs, from Ragiaf to the mouth of the Asua, the difference of level between these points being over 300 feet. He established stations as he went on at Biddin, at Kerrie, and at Appudo. He was, at the latter place, 140 miles from the Albert Nyanza, at the end of August, and was preparing to try the ascent of the rapids at Makedo, 8 miles in advance, and where he had already established a station. The Pasha's steamer, 'Khedive,' in the meantime, taking advantage of the rise in the river, had followed in the same course, forcing her way up the rapids at Biddin and Kerrie, and having nearly reached Appudo by the last accounts. The great trial will be the passage of the steamer from Appudo to Makedo, where there are 8 miles of continued rapids and cataracts. Baker estimates one single fall at 40 feet. If the steamer, with the help of tow ropes, can reach Makedo, the further navigation to the lake, a distance of 130 miles, is without obstacle. Whilst Gordon was occupied with this ascent of the rapids, his assistant Chippendall had pushed on 70 miles beyond Appudo towards the lake,

and had conciliated the tribes of the neighbourhood, but had not succeeded in reaching the lake itself. Both he and Colonel Gordon report, from native information, that the Nile leaves the Albert Nyanza by two channels, but where the western stream rejoins the main river is still doubtful. Colonel Gordon is further inclined to give to the Albert Nyanza a general direction of east and west, rather than north and south. He would assign the greatest width of the lake to the latitude of Magungo, where Baker left it, and where a station is now to be established; and he doubts whether the water of this great basin stretches farther south than the Equator. A sketch-map of this part of the river by Chippendall has also reached us.

The news of Lieutenant Cameron here given in Colonel Gordon's telegrams, is, no doubt, of somewhat older date than stated, and was probably brought to M'tesa's capital by Arab traders from Unyanyembe. We know from Zanzibar that our envoy finally left Ujiji for the west at the end of May, 1874. Since this date no news of him whatever has been received at Zanzibar, although the direct route to Ujiji is more open than it has been for years past.

News of somewhat later date than these telegrams has since been received, to the effect that M. Linant, the bearer of Stanley's important letter, had been killed, with thirty-six of his followers, in an attack by the Bari tribe, when near Colonel Gordon's station. This lamentable event may possibly retard the execution of this officer's plans. Sir Bartle Frere informs me in a letter just received that his Excellency Nubar Pacha told him another telegram had been received which confirmed the report of young Linant's death and of Gordon's having been obliged in consequence to give up for the time his visit to the Albert Nyanza, in order to go and punish the tribe who had attacked the party. This is the second son that the venerable Linant Bey (the great irrigational engineer of Mehemet Ali and Ibrahim Pacha) has lost in that country. With regard to Colonel Gordon's expedition, Sir Bartle writes: "Everyone speaks most highly of Gordon and his doings—the Khedive and his Prime Minister, as well as the English residents and American missionaries. He has not only, so they all say, really checked the slave trade, and still more the slave-hunting, but he has made his expedition almost pay itself by economy and by judicious management of the conquered districts."

I have also much pleasure in announcing that his Royal Highness the Prince of Wales, the vice patron of our Society, has just sent to us, through Sir Bartle Frere, as the first geographical result of his tour in the East, a very interesting collection of route maps of Upper Egypt and its recently acquired dependencies, which have been executed in the Topographical Department of the Egyptian War Office, by General Stone, Chief of the Etat-Major, from materials furnished in one direction by Colonel Gordon, and the officers serving under his orders, and in another by Colonel Purdy and the officers of the Darfur Expedition. These maps, which contain much new geographical matter, and which give an earnest of the valuable aid we may expect to receive in the future from General Stone's well-organized department, were presented to his Royal Highness, under special instruction from the Khedive, by his Excellency Nubar Pacha, the enlightened Foreign Minister of the Egyptian Government, than whom there is no better friend to geography in the East.

Allusion was next made to the German Expedition to West Africa, from which so much was expected, but which was unable to penetrate into the interior in the vicinity of the Congo, the same obstacles which baffled Lieutenant Grandy having again, in this case, proved insurmountable. On the East Coast of Africa, to the south of what is called the lake region, two British parties are at work, not, indeed, ostensibly for the purposes of geography, but still in very little-known regions, where every step in advance brings with it some dis-

covery. Bishop Steere, in the first place, left Zanzibar about two months ago, accompanied by Mr. Alfred Belleville and two other gentlemen, and piloted by Chumah and Susi, Livingstone's two faithful servants, on a benevolent and important mission. The party, indeed, proposed to cross from Lindy Bay, near the mouth of the Rovuma River, to the eastern, or rather to the north-eastern, shores of Lake Nyassa, where they hoped among the friendly Ajao tribe to find a convenient site for the establishment of a missionary station. The other party is that conducted by Mr. E. D. Young, which left England in May last for the purpose of founding a mission station on the southern shores of Lake Nyassa, the friends of the late Dr. Livingstone, in Scotland, having subscribed a sum of about 12,000*l.* for the endowment of this memorial station, to be named Livingstonia, and from whence, it is hoped, civilization and Christianity may be gradually diffused through the valleys of the Zambesi and its affluents. By the last accounts, Mr. Young's party, after experiencing some delay at the mouth of the Zambesi, in putting together the steel boat which they had taken out with them, had departed up the river on their interesting and hopeful mission.

After briefly referring to the work accomplished in the way of the exploration of Palestine, Sir Henry turned to Central Asia, observing that many valuable additions have been lately made to our knowledge of the country, between the Russian frontier and Afghanistan, the result being that by means of Captain Trotter's recent work, and the Russian explorations, geographers will be able, at length, to construct a reliable map of the region between the Upper Oxus and Jaxartes; which will be further improved, if it be true, as stated in the Russian papers, that, after the complete reduction of Kokand, troops will march from Khojend to Germ in order to bring under control the extensive dependency of Karategin.

The island of New Guinea had for some years past attracted much attention, and in the future, probably, it will attract still more attention; for it is almost impossible in the present state of the world, when the nations of Europe have subjugated or colonized so many lands belonging to the Indian Ocean, the Chinese Seas, and Polynesia, that this magnificent island, the queen of the Eastern Archipelago, and immediately contiguous to Australia, should remain much longer in isolated and barren independence. Having noticed the failure of the Italian traveller D'Albertis to obtain a firm footing in the island, and of the Maclay Expedition, of the London Missionary Society, to penetrate the rivers on the south-east coast, the President said that within the last day or two further intelligence had been received from Mr. Stone, which is of great interest. It is the discovery of a river on the south coast of New Guinea, which is navigable for nearly 100 miles into the interior, and which has been actually ascended by the Rev. S. Macfarlane and Mr. Stone, in the London Missionary Society's steamer 'Ellengowan,' for a distance of 60 miles. It is proposed to call this the "Baxter River," after Miss Baxter, of Dundee, to whose generosity the London Missionary Society were indebted for the presentation to them of the 'Ellengowan' steamer, by means of which the southern part of New Guinea has been thus, for the first time, explored.

In conclusion, Sir Henry alluded to the proceedings of the Arctic Expedition.

Mr. WATTS then read a paper on his

JOURNEY ACROSS THE VATNA YOKULL IN THE SUMMER OF 1875.

UPON his arrival in Iceland Mr. Watts proceeded first to examine the glaciers upon the south of the Vatna Yokulls and found that the part of the Vatna known as Breithamerker Yokull had recently advanced to such an extent as to threaten to cut off all communication along that part of the southern shores of Iceland.

Accompanied by twelve Icelanders, he set out on the 24th of June, from Nupstad, a farm on the south base of the Vatna Yokull, and proceeded up the west side of the valley of the Dinþá, which river finds its way over a lava stream flowing from the Vatna Yokull. Arriving at the foot of the Yokull, Mr. Watts commenced the ascent of the frozen mass, but a heavy fall of snow soon compelled him to encamp. Next morning brought only snow and fog; but knowing the locality well an advance was attempted. After an hour's dragging, the fog and the storm increased, and in a short time the snow was so deep and soft as to prevent further progress until its surface was sufficiently frozen to bear. The weather clearing in the evening, an advance was again made, but the snow being up to their knees a bank was erected to windward and they turned in. The thermometer registered 20° Fahrenheit of frost. By 3 A.M. they were again under weigh; it was a lovely morning, the wind north-west, and as the sun illuminated the magnificent snow slopes everything seemed to promise fair weather, and success. They travelled merrily along the frozen snow until they reached Mount Paul, which is a cluster of one large and smaller eminences, rising to a height of 150 feet above the surrounding snow. Here an abundant supply of water was found. The mountain is composed of varieties of obsidian, varying from a highly vitreous obsidian to the grey stone variety.

At this point Mr. Watts sent back four of his men. The weather was execrable, and for two days it was utterly impossible to proceed. His compass had for some time been almost useless. In spite of the deepening snow, they again plodded on, resting every quarter of a mile, but encountering a violent storm were soon brought to the halt; and it was with great difficulty that camp was pitched, for the drifting snow filled up the hole almost as soon as it was dug. The storm lasted for two days. On the third day an observation was taken, and two black conical mountains were perceived, of no great height, one about 5 miles due north, and the other about 11 miles north-west. An excellent view of the Vatna Yokull Housie was here obtained, and the snow-covered ridges, or probably lava streams, leading up to its cone, were perfectly discernible. The next night brought a severe frost, and they again had to seek shelter from a hurricane and snow-storm at a height of 6150 feet. For three days and nights the pitiless storm beat upon their small encampment, but on the fourth day its fury abated, and a start was made.

After a perilous journey, combined with intense cold, the northern base of the Vatna Yokull was reached. A cluster of mountains, from which great quantities of steam were rising and hovering above their summits in a huge mushroom-shaped cloud, rose immediately to the north, while to the north-west lay a wide-spreading lava field: beyond all, the weird forms of fire-wrought mountains formed a fitting background. A huge tongue of glacier at this point swept down to a distance of some 10 miles beyond its most northern limit, as represented upon the map published by Oslen in 1844, from a survey made by Gunnlangssen in 1835. Snoefell was here caught sight of, and upon taking its bearings with the Smoking Mountains, which evidently were the Dyngjufjall, it was found that instead of being at the Kverkfjall, which was the point Mr. Watts had intended to strike, he was upon the east side of Kistufell, about 9 or 10 miles further to the west. They were astonished at being unable to see anything of the Yokull Sá, which, upon Gunnlangssen's map, rises at the foot of Kistufell. Descending, they found themselves in a large water-course, occupied, however, by an insignificant stream, which was easily waded across. No doubt this was formerly the bed of the Yokull Sá. The glacier had advanced completely over the route taken by Gunnlangssen in 1835, thus diverting the course of the river, which now rises in several arms from the extremity of this glacial tongue. Shortness of provisions compelled them to make a series of forced marches, in order to

reach the nearest farm, viz., Grimstasher Es. Steering due north, they crossed a group of low volcanic hills, which were not marked upon the map; beyond these lay a desert of black sand, which the lava of the Odatherkrawn had entered at its south-west corner. In the middle of this small desert rose four eccentric-looking eminences, surrounded by a considerable lava field, the greater portion of which was buried in the sand; a closer approach showed them to be small volcanoes; these are situated in all probability upon a fissure in the centre of the plain. The lava that issued from these volcanoes is basaltic, or doleritic, and bears a close resemblance to the lava from the Myvatu Orceffi.

The ensuing morning the main arm of the Yokull Sá was reached. Here Mr. Watts decided on leaving his tent and the heavier part of his baggage, and strike for Grimstasher, crossing the Svarta (or black river) to the Vadalda Hills. This river rises in the Dyngjufjall, but is soon lost in the sand, re-appearing as the Svarta, which washes the south base of the Vadalda. These hills, although of no great height, command an extensive view to the south towards the Vatna Yokull, which can be easily reached by following one of two valleys, bearing respectively west and south-west. From here the first good view of Kverhrfjall was obtained; it appeared to be a cluster of conical mountains, and one huge crater on the north slope of the Vatna Yokull. This large crater, although partially filled with snow, was smoking at three points, but presented no other signs of activity. Having progressed about a mile upon the Vadalda, they were soon upon the pumice which was ejected last spring from the volcano of Oskja-gja. It has fallen in a line about 25 miles broad, from the centre of the Vadalda to the south of Hethubreith; this pumice has fallen from Oskja-gja in a band of continually-extending radii eastward to the seashore, destroying in its course six farms in the Yokull-daru, and injuring others in the immediate vicinity. This shows that the prevalent winds during the eruption of Oskja-gja must have been south-west. Two nights and a day, with short intervals of rest, brought them to the ferry of Grimstasher, where they obtained a boat and reached the farm of that name. The journey from Nupstad in the south to Grimstasher in the north, occupied sixteen days, twelve of which were passed among the regions of perpetual snow. Mr. Watts here remarked that nothing could exceed the pluck, perseverance, and obedience of the Icelanders who accompanied him, without whom he never could have crossed the Vatna Yokull.

Resting for three days, they started for the Odatherkrawn, in order to inspect the volcano whence the pumice had been this year erupted. It is situated in the southern portion of the Dyngjufjall Mountains, or Agskja, which means oval wooden casket. Proceeding across the lava and sand desert of the Myvatu Orceffi, to the little river of Gravalanda, upon the banks of which and those of its neighbour, the Luida, they found good feed for the horses. It was upon the banks of these rivers, beneath the shadow of the snow-capped Hethubreith, that the last of the Icelandic outlaws found a shelter. Hethubreith is one of the highest mountains in Iceland. The banks of the Gravalanda were in places thickly grown with birch and salix, but the larger wood was dead.

A weary march across the pumice brought them to the little desert where their tent had been left. Proceeding to Dyngjufjall, these mountains were found to consist of a series of semi-detached sections, some of which had broken out in ancient times, and by their insignificant lava streams had helped to swell the widely extending lava desert of the Odatherkrawn.

These sections of mountains described a heart-shaped form upon the south, inclosing the Askja. This is a three-cornered piece of elevated land 4000 feet high, about 6 miles long and 3 or 4 miles broad; it is easily reached by a glen upon the north-east side of the

Dyngjufjall. The principal crater which erupted this year is situated in the south corner of the Askja.

The Gja is enclosed upon the eastern and western sides by mountains rising in some instances 1000 feet above the Askja Plain: they appear shorn of their inner faces by the violence of the eruption, forming perpendicular cliffs of great height. It is well worth going to Iceland to stand upon the summit of one of the surrounding mountains and look into the yawning Gja which opens at one's feet, its grim chasms and black pits all contributing to the general aggregate of steam and loam stench, and horrid sound, while behind stretches a wild waste of glen, desert, and mountain, a country mourning in ashes and howling with desolation.

Leaving the volcano of Askja behind them, and proceeding in a westerly direction, they perceived that the lava from the Odatherkrawn had entered the Askja upon its most western side, having run for a considerable distance up hill. Upon descending the Dyngjufjall to the west, a broad plain, barren and black with sand and lava opened before them; this was the Odatherkrawn.

There was the snowy mound of Skjaldbreith, spotted with protruding lava, with its curious tuft of rock at the top, somewhat similar to that on Hethabreith; further to the east lay Kistufell, and behind, all the white expanse of the Vatna Yokull sweeping the horizon from east to west, where it is apparently joined by Tindufell Tunafells and the Hofo Yokull, for from this position they could not see Sprengo Sands. Skjaldbreith is a mound of basaltic lava partially covered with snow, rising to a height of about 4000 feet. Eruptions from this mountain appeared to have taken more the form of prodigious boilings-over rather than that of terrific outbursts.

In conclusion, Mr. Watts said, while sojourning among the sheep pastures of the north, his attention was arrested by stupendous columns of smoke arising from the direction of the Myvatu Orceffi, and spreading out like phantoms of mammoth palm-trees amid the calm atmosphere of an autumn Sabbath morning. It was in the Myvatu Orceffi that the violent volcanic outbreaks occurred last spring. Upon emerging from a valley which runs through the hills of Myvatu, a line of some twenty columns of smoke proclaims the seat of volcanic activity; from the north end of these a conical mound about 150 feet in height is erupting with considerable violence, and is rapidly forming a cone within a large crater which had evidently been formed by a previous eruption; a column of cinders is being shot to twice the height of the volcano itself, and a copious lava stream is flowing from a breach in its most northern side and from a smaller opening at the base of the cone. We find thus, that the Vatna Yokull is a mass of ice and snow resting upon a nest of volcanoes; that its glaciers are rapidly increasing; that it is encroaching both upon the north and upon the south; and, granting that the Vatna is a fair specimen of the Icelandic Yokulls, that nothing can save Iceland from the advancing glaciers but a cycle of propitious seasons. We begin to recognise what an important effect this huge refrigerator has upon the climate of the north of Iceland; how it shields the northerland from the aqueous vapours which travel upward from more southern latitudes, receiving upon its broad shoulders an inordinate amount of hail and snow. We find the Odatherkrawn and the country immediately to the north of the Vatna to be a wilderness wherein the scissuric forces of Iceland are still keeping up their erratic character by breaking out where least expected. First they break forth amid the snows of the Vatna, then amongst mountains which for ages had smothered volcanic energies, then in the middle of a plain already rendered almost desolate by prehistoric outbursts. This eccentric shifting of volcanic force in Iceland may perhaps be due to the many cracks and fissures which doubtless already exist in the superficial rocks occasioned by the violent earthquakes which have from time to time convulsed the island.

A brief discussion followed the reading of the paper.

IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

THIS Society resumed its monthly meetings on the 8th (20th) October, under the presidency of M. R. Semenof,

M. Wilson, the secretary, drew attention to the chief geographical events which had recently taken place, among which he specified the Hissar Expedition; the expedition in North-Western China, of Lieutenant-Colonel Sosnolsky (of whose safe arrival at Saissan intelligence has been recently received); the journey of Professor Nordenskiöld, through the sea of Kara, and his ascent of the Yenisei; and the part played by Russia in the International Geographical Congress at Paris. With reference to the last subject, he mentioned that the government had greatly contributed to the success which Russia had achieved, by devoting special funds to defray the expenses of the organization of their section. The thanks of the Society were tendered to M. Khanikof, the Government Commissioner, for the devotion and ability displayed by him in his duties.

M. P. Semenof then delivered a short address, in which he congratulated the Society on its successful *début* at the Congress, and attributed this partly to the careful efforts of Count de Lütke and his coadjutors, and partly to the varied and extensive labours of such institutions as the Staff College, the Pulkhova Observatory, and the museum attached to the military schools.

M. Janson then read a paper on the general aspects of the Paris Geographical Exhibition, and after the election of some new members the meeting broke up.

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PARIS GEOGRAPHICAL SOCIETY.

THE first November meeting was held on the 4th, under the presidency of M. Delesse. M. Maunoir, the Secretary, announced that a merchant captain named Lorrain had recently fallen a martyr to the cause of geographical science. He had chartered a vessel at his own expense, with the object of exploring the western coast of Africa. The crew, mainly composed of negroes, had mutinied against their captain, and left him bound to a rock in the middle of the sea. Here his body was discovered by some Englishmen. Among other items of intelligence, M. Maunoir mentioned that M. Bonnin, another French traveller, has also fallen into the hands of some of the negroes on the Gold Coast, but there is good reason to hope that English influence will not suffer him to be ill-treated. M. Largean, who has been entrusted with the leadership of an expedition into the Sahara, has been warmly received by the Governor and the Chamber of Commerce in Algiers. Both General Chanzy and the Geographical Society have promised to contribute funds towards this undertaking, and some public meetings in support of it will be held in Algiers. An expedition has also been despatched to the Gaboon River under M. Savorgnan de Brazza.

M. G. Biard then gave a sketch of a scheme proposed by him for organizing a scientific tour round the world; the party to be composed of fifty travellers, each of whom would guarantee 800l. towards expenses.

Two papers followed, one by M. Duveyrier on Mr. Stanley's exploration of Lake Nyanza, and another by M. Malte Brun on the Arctic expeditions up Smith Sound, more particularly with reference to the progress and prospects of H.M.S. 'Alert' and 'Discovery.'

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DRESDEN GEOGRAPHICAL SOCIETY.

WE have received the Twelfth Annual Journal of the Dresden Geographical Society, which contains the following papers:—On the result of height observations made in Colombia and Ecuador, by Drs. Reiss and Stuebel; Notes on the religion and customs of the Mafoor Papuas in New Guinea, by Dr. Meyer; Sketches from Dardania and Albania made by Herr Rockstroh in 1874; A journey through the interior

of Finnmark, by G. Pauli; Ashurada, by Dr. J. C. Hantzsche, and Notes on magnetic declination and inclination, by Herr Kahl.

ASHURADA.

The article on Ashurada, by Dr. Hantzsche, is a very complete one, based on three visits made by him in 1855, 1859, and 1861. He describes it as a sandbank, about $\frac{1}{4}$ kilometer in length and $\frac{1}{4}$ kilometer in breadth. There is very little vegetation, and the few gardens are poorly stocked. Water is easily got just below the surface, and though brackish is not deleterious. The prevailing winds are from the north and west, while in winter and spring time a warm, dry wind blows from the direction of the forests on the mainland. The climate is moist, snow being of rare occurrence and rains frequent; it has the reputation among the Russians of being very unhealthy, and has, consequently, deterred many from settling there; but Dr. Hantzsche inclines to think that Ashurada is no worse than most other places on the south coast of the Caspian. The number of houses is about fifty: they are small, one-storied buildings, of clay and wood, and thatched with rushes. At the western end of the island is the house of the flag or commanding officer, and in front of it are four iron three-pounders. The old burying place is hard by, but corpses are now conveyed to the extreme point of the uninhabited peninsula of Miaukela and interred there, on Persian territory, at a depth of about six or seven feet. The dwellings of the families of the soldiers are to the north of the island, and a Russian church is also situated there. A broad road leads to the eastern end, where there is a barrack and a hospital with nine beds. Two Russian navy surgeons, one of whom finds work enough for several weeks in the year in Asterabad and Mazanderan, are attached to the hospital. The interpreter, Mirza Daud, lives farther to the east of the island. He is an Armenian in the Russian service, and speaks, besides his native language, Tartar, Persian, Russian, and French, and has another house at Gez on the mainland. There is also an old Turkman named Khidr-Khan, who lives here and acts as a sort of go-between with the Russians and Turkmen. The furthest buildings to the east are a wooden store belonging to the then (*i.e.*, in 1861) new Trans-Caspian trading company. Some of the sailors work as bakers, carpenters, and blacksmiths, and the soldier are perfect jacks-of-all-trades.

The sea all around is so shallow that vessels are obliged to anchor at a distance, and communicate by boat, the favourite anchorage being opposite the south-east part of the island. A small, lightly-armed Russian transport vessel is usually stationed near the Persian coast at Gez, to keep an eye on the Turkmen, while some small gunboats do a like service along the coast northward. The arms are in most cases pivot guns, while the sailors, artillery, and infantry carry flint-muskets. The vessels are remarkable for their discipline and cleanliness. The crew and officers are usually changed every three years, and are under the orders of the flag-officer at Ashurada, who in his turn usually stays here for a rather longer period, and is dependent for instructions on the Admiral of the Caspian fleet, and also on the Russian Legation in Teheran. All things considered, Dr. Hantzsche thinks a vast improvement has taken place in Ashurada since the days when Holms and Abbott visited it in 1844, while frequent communication with Astrakhan, Baku and other ports supplies its inhabitants with the requirements of civilization. The Russians act the part of a marine police of Ashurada, but this is by no means relished by the Persians, who show their displeasure in a variety of petty ways.

Dr. Hantzsche concludes by pointing out that as from Gez, Asterabad and Ashraf, roads which can easily be made practicable for cannon lead over the passes of the Elburz, and that from Damghan, Shahrud and Bostan, main lines of road lead to Teheran in the north of Persia, to Isfahan and Yezd in Southern Persia, to the ever-unsettled province of Khorasan, and lastly to

Herat and Kandahar, it is easy to see the enormous importance of Ashurada to the Russians.

EGYPTIAN GEOGRAPHICAL SOCIETY.

November 12th, 1875.—Dr. G. Schweinfurth, the President, stated that application had been made to 250 Societies for an exchange of publications, but that up to the present time only twenty-five amongst them had responded to this appeal. Egypt had hospitably received many travellers, and supported generously several geographical explorations, and he trusted that this would be acknowledged abroad, and result in large accessions to their library. The geographical societies of Paris, St. Petersburg, Amsterdam, and Vienna, and the Academy of Metz, had promised complete sets of their publications. The German emperor had presented a copy of *Lepsius's Egyptian Monuments*, and many private authors had forwarded their works. The Society now numbered 300 members, about half of whom resided at Alexandria, and its annual income amounted to 1400*l.* The Khedive had treated them most liberally. He had placed at their disposal a suite of six rooms, and free railway tickets were granted to the members residing at Alexandria, to enable them to attend the meetings. The material condition of the Society left, therefore, nothing to be desired; but it was necessary that it should set about now to do some real work, or it would be looked upon abroad as a *mirage trompeuse*. The military character of most of the expeditions now engaged in the interior of the country precluded scientific work. Several expeditions of this kind were now in the field, and the Society might be charged abroad with not availing itself of the opportunities for exploration thus afforded. Men of science should be attached to these expeditions more frequently, but not those quasi-savants who had inundated the country, and whose incapacity was a matter of notoriety at Cairo. He called upon the members to use their best efforts for procuring information worthy of being printed in their proceedings.

General Stone protested against the statement that the members of his military expeditions were deficient in scientific requirements. They were not savants, strictly speaking, nor was it the object of military expeditions to promote science. Dr. Schweinfurth said that he fully appreciated the service rendered by the American officers to the country, and considered that they were invaluable. As President of the Society, however, he was bound to be egotistical, and for this reason he advocated scientific research independently of the military surveys. The Society not only desired to publish the maps, which resulted from the surveys made by officers of the staff, but likewise memoirs which illustrated them.

Linant Pasha, and the astronomer, Mahmud Bey, were then elected Vice-Presidents, and the Secretary of the Society, Marquis de Compiègne, read a report on the Paris Geographical Congress.

NOTICE.

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