

V.—*On the Geographical Results of the Mission to Kashghar, under Sir T. DOUGLAS FORSYTH in 1873–74.* BY Capt. H. TROTTER, R.E.

[Read, May 13th, 1878.]

ABOUT this time five years ago, I was in the peninsula of Kattywar, in Western India, seated in an arm-chair outside my tent-door. The hot wind which had been blowing through the day had just lulled, but the thermometer stood at over 100°; and I was, after an unusually hot season, which had taken a good deal out of me, anxiously expecting a favourable reply to an application I had made for furlough to England. A telegram was suddenly put into my hands which very speedily altered the current of my thoughts. It was from my chief, Colonel Walker, the Superintendent of the Great Trigonometrical Survey, informing me that the Viceroy of India was about to despatch a Political Mission to the Atálik Gházi of Yárkand, and that an officer of the Survey Department would probably be deputed to accompany it as Geographer. Would I like to go? My first act was to despatch an immediate reply in the affirmative, and my second—I feel ashamed in this assemblage at having to confess it—was to get hold of an Atlas and make search as to what part of the Asiatic continent Yárkand was to be found in. Happily I have, since then, had considerable opportunities of adding to my stock of knowledge concerning that then little-known portion of Central Asia, to which I was shortly to proceed. It is for the purpose of communicating to the Royal Geographical Society some of that recently-acquired knowledge that I have the honour of standing here this evening.

The Mission under Sir Douglas Forsyth was despatched by the late Viceroy of India for the purpose of making a treaty of friendship and commerce with the Ruler of Eastern Turkistan—then called Yakoob Beg, the Atálik Gházi of Yárkand—of late years better known as the Amír of Kashghar.

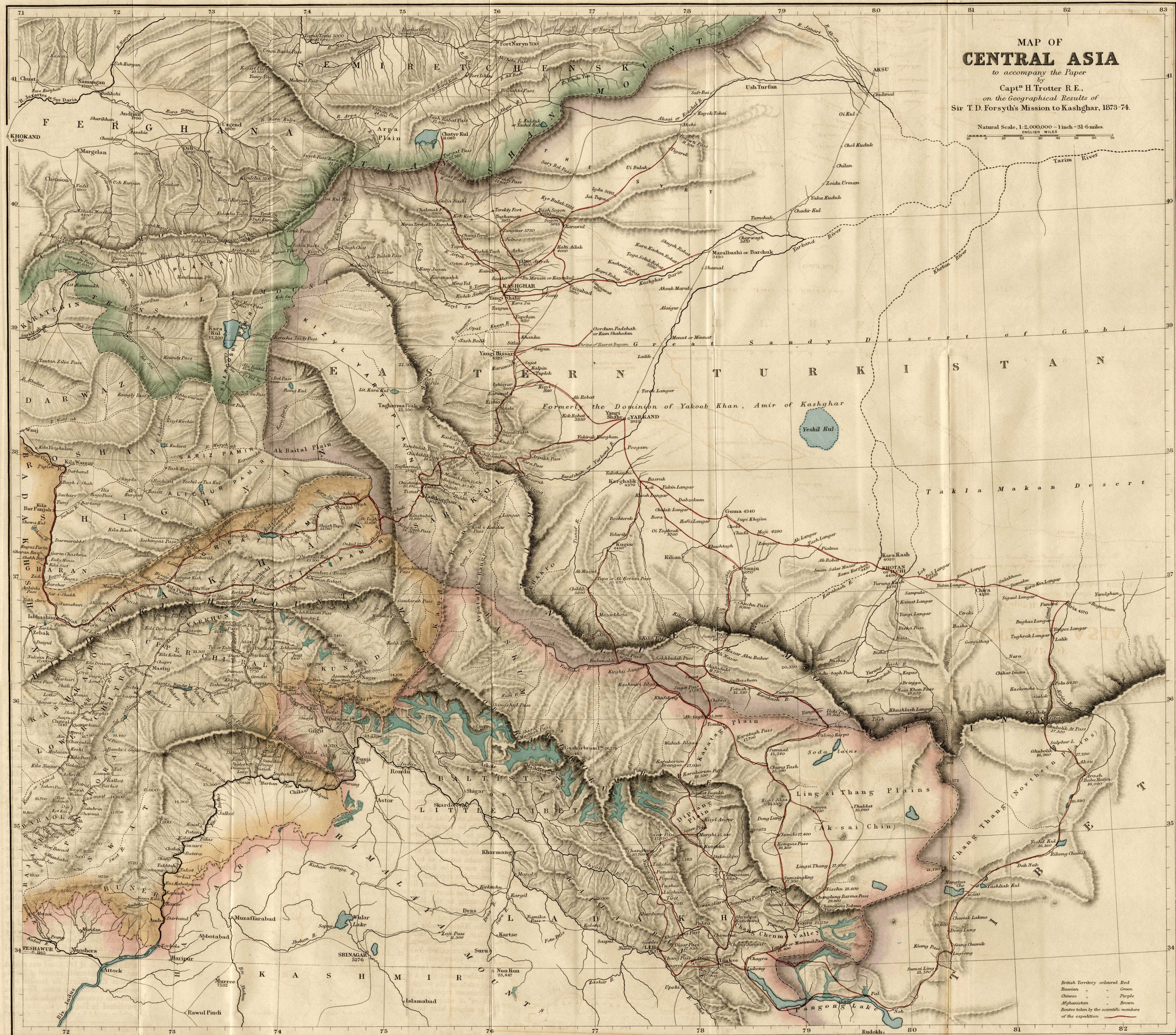
The Mission left India in the summer of 1873, and was absent for rather more than a year. A considerable amount of literature exists on the subject of this Expedition; for besides very voluminous reports to Government from the seven European officers* of whom the Mission was composed, two books on the same subject have been published in England, viz., the 'Roof of the World,' by Colonel Gordon, and 'Kashmir and Kashghar,'

* Sir T. Douglas Forsyth, C.B., K.C.S.I., Envoy and Plenipotentiary; Colonel T. E. Gordon, C.S.I.; Dr. H. W. Bellew, C.S.I.; Capt. John Biddulph, 19th Hussars, A.D.C. to the Viceroy; Capt. Chapman, R.H.A.; Dr. Ferdinand Stoliczka; Capt. Henry Trotter, R.E.

MAP OF CENTRAL ASIA

to accompany the Paper
by
Capt^d H Trotter R.E.,
on the Geographical Results of
Sir T.D. Forsyth's Mission to Kashghar, 1873-74.

Natural Scale, 1:2,000,000 - 1 inch = 31.6 miles
ENGLISH MILES
0 10 20 30 40 50 60 70



British Territory coloured Red
Russian - - - Green
Chinese - - - Purple
Afghanistan - - - Brown
Routes taken by the scientific members
of the expedition - - -

by Dr. Bellew. The volume of 'Reports' also contains an interesting series of photographs taken, under circumstances of great difficulty, mostly by Captain Chapman; some few by myself.

Much of the following narrative is taken from my own section of the volume of 'Reports,' of which not many copies were printed, and but very few have been made available to the general public. To that volume,* however, I must refer all those who may wish for further information on the astronomical, meteorological, and hypsometrical and magnetic observations taken during our absence from England, as also for detailed itineraries of all the routes traversed by the various members and employés of the Mission.

The roads between Leh and Yárkand, and the nature of the country traversed, have on a former occasion been eloquently described to the Society by their Gold Medallist, Mr. Shaw, the pioneer of English influence in Eastern Turkestan, as well as by the intrepid Hayward, who lost his life in endeavouring to reach those unknown and almost inaccessible Pámír regions which it was afterwards our good fortune to travel. I will only, therefore, rapidly glance at some of the physical obstacles actually encountered along our line of march. The first thing that strikes an outsider is the extreme circuitousness of the road. It will be observed that starting from Simla, the summer headquarters of the Government of India, our ultimate destination being Yárkand, we have first to travel nearly south for 100 miles to Umbálá—then, in a north-westerly direction, to Rawul Pindi, a distance of 370 miles; for 200 of which, from Umbálá to Lahore, we were aided by the railway—and the last 170 miles by wheeled carriages on a good highway. From Rawul Pindi, 40 miles up-hill to Murree, one of our hill sanitaría, we are further aided by wheeled carriage. From this point onwards, all our journeys were performed on horseback, except where the difficulties of the ground compelled us to go on foot; or, in the case of ice, to mount on yáks. Our tents, baggage, and supplies were carried by men, ponies, mules, donkeys, oxen, yáks, or sheep. From Murree our road lay nearly due east right across Kashmír Proper to Leh, the capital of Ladákh, originally a province of Western Tibet, but now under the rule of the Maharaja of Kashmír. The road from Murree to Leh, a distance of 390 miles, is too well known to require description here, and in the summer season presents no formidable difficulties, although we experienced considerable discomforts in the way of rain and heat. For several months in

* 'Account of the Survey Operations in connection with the Mission to Yárkand and Kasighar in 1873-74.' By Captain Henry Trotter, R.E., Deputy Superintendent Great Trigonometrical Survey of India.

the winter season, however, all traffic is stopped by the snow on and in the vicinity of the Zoji La, the point where the road crosses the watershed of the main Himalayan chain, at an elevation of 11,300 feet above the sea. According to the Kashmir Route-book it is 31 marches, or 389 miles, from Murree to Leh, *viá* Srinagar; while it is 36 marches, or 461 miles, from Leh to Simla direct, the route by which I returned to India. This direct road, however, is only open for a few months in the year. On the whole traders generally prefer the longer, more circuitous, but easier route by which the Mission proceeded.

All traders from India to Yárkand are compelled to pass through Leh, it being the only place where fresh baggage-animals and supplies can be obtained for the onward journey. For all practical purposes the roads thence to Turkistan may be divided into three, viz:—

The Kárákorum route with variations (leading to Yárkand).

The Chang Chenmo route with variations (leading to Yárkand and Khotan).

The Rudokh (or Chang Thang) route (leading to Khotan).

The Kárákorum route may be subdivided into two, the Zamistáni or winter and the Tabistáni or summer road, and although these have a few marches and camping-grounds in common, and cross the watershed between India and Central Asia at the same point, the Kárákorum Pass, yet they diverge from each other throughout the greater part of their courses. As a rule it may be laid down that the winter road passes, wherever possible, along and over the beds of rivers, which in the cold season contain but little water, and are generally frozen over: these streams, which form no obstacle in winter, are often impassable torrents in summer, in which season also there is much danger from avalanches in many parts of the road. It is therefore no matter of surprise that, in spite of the intense cold and hardships of a winter journey, the merchant often selects that season for his travels. The first great obstacle to be encountered, after leaving Leh, both in summer and winter, is the well-known Kailás Range. To the north of Leh this range divides the drainage of the Indus and the Shyok, and is one of the most formidable obstacles to be encountered by the traveller to Turkistan. In winter it is crossed by the Digar La (17,930 feet above sea-level), a very difficult pass, in crossing which it is necessary to employ either yáks or men for the carriage of goods. A party of the Mission went over it in June, and even then there was snow lying on the top, while ice and snow combined to render the passage difficult along a distance of some miles.

The summer road crosses the Khárdung or Leh Pass,* almost north of Leh, and is 17,900 feet in height. This pass also is impracticable for laden ponies, and is so difficult that late in June, on our return journey from Yárkand, after descending the Nubra River, it was deemed advisable to go a long detour, *viá* the Digar Pass, in order to avoid the still more formidable obstacles on the Khárdung. This made the journey from Sati to Leh 42 miles instead of 29. After crossing the Kailás Range and entering the Shyok Valley, the traveller has now before him the great Muz-tágh † or Kárákorum Range. In the winter by following the narrow, winding, and difficult valley of the Shyok River, he reaches the Kárákorum Pass, a distance of 114 miles: in the course of this portion of the journey the frozen surface of the stream has to be crossed no less than thirty-six times. In winter this can easily be done, as it is generally bridged by snow and ice; but in summer, owing to the floods caused by the melting glaciers, an entirely different route has to be adopted, and, instead of ascending the Shyok, the traveller descends that river to a short distance below Sati and then ascends the Nubra River, a large tributary fed from glaciers in the same mountain mass that supplies the Shyok.

The Shyok is crossed in boats near Sati, where in the summer it is a very large and rapid river. Passengers and goods are carried over in boats, while the baggage-animals are made to swim across. Many of the latter are drowned in crossing.

Ascending the Nubra Valley, one of the most fertile and richly cultivated in Ladakh, the traveller goes as far as Changlung (10,760 feet), almost the highest village in the valley, and situated about 40 miles above Sati. The merchant generally takes this bit very easily, advancing by short marches of ten miles each, in order to make the most of the supplies of grain and excellent lucerne-grass, both of which are here obtained in abundance. The caravans from Yárkand often halt a week at Panamik (a large and flourishing village a few miles below Changlung), to feed and rest the baggage-animals after the hard work and scant fare that they have had on the journey. It is here that on the outward journey the real difficulties of the march commence. Instead of following one stream right up to its source in the Kárákorum Pass, as is done in the winter route, the traveller has first of all to cross a very high and precipitous hill just above Changlung village. The road ascends by a zigzag and rises rather more than 4000 feet in a length of about 4 miles, the stiffest bit of ascent on the whole journey to

* Sometimes also called "Laoche La."

† In Turki "Muz-tágh" means "Ice Mountain," and "Kárákorum" is the equivalent of "Black gravel."

Yárkand. After reaching the top of the Karawal Pass, the road descends into the Sásér stream and then passes up it to the Sásér La, a pass over a mighty ridge covered with snow and glaciers, which runs down from the great mountain mass forming the eastern extremity of the so-called Kárákorum Range, and separates the waters of the Nubra* from those of the Shyok. This pass (17,820 feet) is one of the most difficult on the whole road, and is rarely, if ever, free from snow; while the road passes through, over, and alongside of glaciers for many miles.† The road from the top of the pass follows the bank of a stream which enters the Shyok River at Sásér Polu, a halting-place on the winter road. The Shyok is here crossed with difficulty, as is proved by the fact that two Ladakhis were drowned there when returning from laying out supplies for our return journey.

The road now descends a tributary stream on the left bank of the Shyok, crosses a low pass, and at Murghi Camp joins another stream which flows from the Dipsang plains into the Shyok River. It was at this point, at a height of 15,200 feet, that our comrade, Dr. Stoliczka, breathed his last, after having traversed the Kárákorum Pass, and the perhaps still more trying Dipsang plains which rise to an elevation of about 18,000 feet above the sea. The intense cold of this bleak and dreary waste prevents this route from being adopted in winter, during which season the caravans follow the Shyok River, from Sásér Polu up to Daulat Beguldi (Turki for "Daulat Beg died," an appropriate name for so desolate a spot). This camp, which is situated in the north-west corner of the Dipsang Plain, marks the junction of the winter and summer routes, which unite here, and cross the Kárákorum Pass, 11 miles above the camp, continuing together a distance of 40 miles farther to Ak-tágh. The Kárákorum Pass, though 18,550 feet above the sea, is by no means so formidable an obstacle as is generally supposed. It is always free from glaciers, and in summer from snow. The ascent on both sides is gentle, and the road good; so that, although it forms the water-parting between Hindústán and Central Asia, it is less of an obstacle to the merchant than the Digar, the Khárdung, the Sásér, or the Sánjú passes. From it the road passes along the Kárákorum stream (one of the head-waters of

* At the head of the Nubra Valley a road passes over the main Kárákorum chain by the Chorbut Pass and descends into the Yárkand River at Khufelong. It was formerly much used by the Baltistan merchants, but is now rarely employed. It is probably not less than 15,000 feet high, and is always closed for at least nine months in the year, and is at no times practicable for laden animals.

† On the return journey of the Mission, several hundreds of coolies were employed for some weeks in preparing the road over this pass.

the Yárkand River) to Ak-tágh, traversing the comparatively open ground on the west of Kárátágh Plain.* At Ak-tágh the roads again diverge, the winter route continues down the Yárkand River, which is crossed eighteen times between Ak-tágh and Kúlúnaldi,† a distance of 74 miles. At the latter place this road ascends the range that was called by Hayward the "western Kuen Luen," and crosses it by the Yangi-Diwan (or "New Pass," 16,000 feet), into the Tiznáf River, whose course it follows for 41 miles to Chiklik. The road is here taken over one of the northern spurs of the Kuen Luen by the Tupa‡ or Ak-korum Pass (10,470 feet), whence it descends along the banks of a gently sloping stream to Kugiar, a considerable village (containing 400 or 500 houses) on the borders of the plains of Eastern Turkistan, and 41 miles distant from Karghálík, a large town situated at the junction of the Zamistáni (viá Kugiar), and the Tabistáni (viá Sánjú) routes. It was by the Kugiar road that the Mission returned to India. The road had been closed for several years previously by order of the Yárkand authorities owing to the risk to which travellers were exposed of being plundered and sold into slavery by the wild Kunjud robbers of Hunza and Nagar, who, coming down from their fastnesses to the north of Búnji and Gilgit, used to render the whole valley of the Yárkand River from Kúlúnaldi up to Ak-tágh utterly unsafe for travellers or merchants, unless in large parties and well armed.§

It was in the month of June that the Pámír party returned by the Kugiar route somewhat too late in the season to traverse

* "Kárátágh" = "Black Mountain."

† "Kúlúnaldi" = "the wild horse died."

‡ In Turki "Tupa" means "hill," and "Ak-korum" "White gravel."

§ These robbers, apparently from fear of the Kashghar Amir, have of recent years ceased to infest this road; but it is reported that, since the return of the Mission from Yárkand, the Kunjudis have attacked a nomadic tribe called Phakpos, who inhabit numerous valleys on the west bank of the Tiznaf River. The road by which these robbers advance must pass over numerous glaciers, and crosses the Kárákorum Range by the Shingshul Pass, a short distance to the west of the Shigar or Muztágh Pass. The road from Shingshul descends the Kum stream and joins the road from the Muztágh Pass at a distance of one and a half marches to the north of the latter. After three short marches more, the Yárkand River is reached at Dahn-i-Bazar Darah, three short marches below Kúlúnaldi (on the same river), a frequently used halting-place on the road between Kárákorum Pass and Kugiar. The Shingshul Pass is said to be easier than either the Chorbut or the Shigar Passes, and is at times passable by laden horses. The Muztágh Pass (which was estimated by Godwin Austen at 18,400 feet, and by the Schlegelweits at 19,000 feet) road lies for a great distance over glaciers, and is difficult and dangerous. It is occasionally used by the Baltis,¹ who have a colony in Yárkand, and who traverse this pass when returning thence to their own country.

¹ Or natives of Baltistan, a mountainous district inhabited by Shiáh Mussulmans, and lying to the north-west of Ladakh.

it with safety, and considerable danger was incurred from the daily increasing floods of the Tiznáf River, which after noon used to come down with such force as frequently to close the road. At this season, also, the southern slopes of the Yangi-Diwan (Pass) are very difficult to traverse and somewhat dangerous, as the recently dead bodies of numerous baggage-animals seen by us on the return journey too surely testified. The floods of the Tiznáf are probably worse in June and July than at any other time of the year, as after that period the snow on the lower mountains has nearly all been melted. The Yárkand River, on the other hand, above Kúlúnaldi, being principally fed by glacier-streams, is more difficult later on in the hot weather. Although there was a much larger body of water in the Yárkand than in the Tiznáf River, yet in the former the bed was broad and level, and was crossed without difficulty; whereas in the Tiznáf the stream is narrow, and the bottom generally composed of large stones and boulders, which renders its passage very difficult. On one occasion during the return journey, when I had gone on a couple of days ahead of Colonel Gordon's party so as to have more time for survey, I had, in order to insure security from water, placed my chronometers in my pockets, instead of the mule-trunks where they were usually carried. It was the first time that I had done so, and as ill-luck would have it, I twice got parted from my horse in deep water while searching for a ford, and had to swim for my life with my chronometers in my pocket. On the same occasion my horses and baggage-animals were cut off from all supplies by the floods, and were for more than thirty-six hours without tasting food. The road crossed the river nearly twenty times in one march, or about once in every linear mile of its course. A month earlier in the season (May) the river was frozen and was ascended by an advanced party of natives without difficulty.

Returning to Ak-tágh, the point of divergence of the two routes, the summer road passes thence over a spur of the Kuen Luen by the Sugét, a tolerably easy pass (17,610 feet), from which the road descends along a winding stream to the Kára-kásh River, which it strikes a few miles above Sháhídúla.*

* At Sháhídúla is a small fort which, during the time of the disturbances in Eastern Turkistan (which resulted in the accession of the present King), was occupied by a detachment of the Maharaja's troops from Kashmir. These were subsequently withdrawn, and the place is now generally recognized as belonging to the Kashghar ruler. The Kirghiz of Sánjú have of late years constantly occupied the Kára-kásh Valley up as far as the great bend above Sora, and occasionally ascend some of the valleys to the south, leading up to the Karátágh plain. In many of these valleys there is abundance of grass and wood.

Below Sháhídúla the Kárákásh River winds through the Kuen Luen Range.* The road follows along it for some 20 miles, and occasionally crosses it. In summer its passage is effected by merchants with considerable difficulty. The Kárákásh flows in the direction of Khotan, and between the river and Yárkand lies a formidable spur from the Kuen Luen, which has to be crossed. The traveller, if he be here unfettered by political obligations, has the choice of three roads before him, viz., by the Kilik, the Kilian, and the Sánjú passes. Traders are seldom or never allowed to use the former, which is said to be the easiest and shortest; it follows the course of the Toghra, a considerable stream which enters the Kárákásh 9 miles below Sháhídúla. The floods of this stream in hot weather often detain travellers a considerable time on its banks. The Kilik Diwán (Pass) is crossed in the third or fourth march from Sháhídúla, and after going over another low pass the road joins the Kungiar route at Beahterek, one day's march to the south of Karghálík; little is known of this road, but it is said that grass and wood are to be found at every stage. It was once much used by the Baltistan merchants who are settled in Yárkand.

Nearly 3 miles below where the Toghra-su enters the Kárákásh River is the fort of Ali Nazar, where the Kilian road leaves the Kárákásh Valley and passes up an open ravine in a north-west direction. This road is sometimes used in the summer as an alternative to that over the Sánjú Pass; it is somewhat higher, but, although impracticable for laden horses, is not so difficult to traverse. The Kilian Pass is crossed in the second day after leaving the Kárákásh. The road follows the stream from the pass for four marches, when it debouches into the Turkistan Plain at the village of Kilian, two marches to the south of Bora on the road between Sánjú and Karghálík.†

The third and most frequented road from Sháhídúla is *viá* Sánjú. It leaves the Kárákásh 20 miles below Sháhídúla at Mazár Abú Bakar, from which place the road ascends to the summit of the Sánjú (also happily named "Grim") Pass, which, although not more than 16,700 feet above sea-level, was decidedly the most difficult obstacle encountered by the Mission on the road to Yárkand. Its summit is never free from snow and ice, and is impassable by laden ponies. Yáks have always to be used and are collected from all quarters for the passage of a large caravan. From the pass the road descends to the Sánjú or Sarikia River, which it follows to the

* Dividing it, according to Hayward's nomenclature, into Eastern and Western Kuen Luen.

† In former years the Kilian would appear to have been the most frequented route, but it is now little used.

large and scattered village of Sánjú, on the borders of the great Turkistan Plain. Occasionally, in the hot season, the Sánjú River is so flooded in its lower course as to become impassable, in which case a detour is made by a road which crosses a small spur by the Chuchu Pass (11,800 feet), and then follows the Arpalek stream to near Sánjú. Thence a good and level road leads to Yárkand, a distance of 122 miles, and meets the Kilian route at Bora, and the Kilik and Kugiar routes at Karghálík.

Let us return to the Chang Chenmo route from Leh to Turkistan. The road ascends the Indus for 20 miles, and then goes up a tributary stream for 13 miles to Zingrá, from which place the Kailás range may be crossed either by the Chang La (17,600 feet), or the Kay La (17,900 feet). By the former and easier road of the two it is 23 miles from Zingrá to the large village of Tánkse, situated on one of the tributaries of the Shyok River. By the Kay La foot-passengers shorten the road by some 6 miles. The roads over both passes, although free from glaciers, are very difficult; and it is usual, although not absolutely necessary, to employ yáks in carrying goods across.

Tánkse is the last place on this road where supplies are procurable, and is, by the shortest route, 350 miles from Sánjú, the first large village encountered in Turkistan. For the whole of this distance supplies of grain, both for men and horses, have to be carried, and at a great many halting-places neither grass nor fire-wood is procurable. From Tánkse, after passing Lukong at the head of the Pangong Lake, the road crosses a lofty mass of mountains by the Lankar or Marsmik La (18,400 feet), a very high, but in summer by no means a difficult pass. It is free from glaciers, and generally clear of snow during the summer and early autumn. Descending into the Chang Chenmo Valley and crossing the stream, a tributary of the Shyok, the road ascends a side ravine to a point 8 miles beyond Gogra, from which there is a choice of three different roads all leading on to the Ling-zi-Thang * Plains.

The most westerly path ascends the Changlung Pantung Pass (18,900 feet), and descends into a deep ravine running along the stony and very difficult bed of a stream † (which ultimately finds its way into the Shyok River), ascends again, and skirts the western border of the gently-undulating Ling-zi-Thang Plain, in traversing which the traveller crosses, almost without

* Or Ak-sai Chin.

† The march down this ravine was one of the most trying encountered during the outward journey.

knowing it, the watershed between India and Central Asia. After passing the watershed the road crosses a small stream, one of the head waters of the Kárákásh, and then goes over a spur (Kompás La) 18,160 feet in height, and descends into the bed of the Kárákásh River, which it strikes at an elevation of 17,400 feet above the sea and follows to Kizil Jilga.

The portion of the road between the Changlung Pantung Pass and Kizil Jilga is perhaps the most trying part of this route. The great elevation and consequent bitter cold is much aggravated by frequent snow and a piercing wind which blows from morning to night; the long dreary marches cause one to arrive after dark at camps where there are scant supplies of fuel, and no grass; occasional ice-beds block up the whole road, one of these extends for three miles down the Kárákásh River; all combine to try most severely both man and beast.

At Kizil Jilga the road just described joins an alternative road (taken by Captain Biddulph on the outward journey), which, leaving the usual route a few miles north of Gogra, crosses the Changlung Barma Pass (19,300 feet) on to the Lingzi-Thang Plains, along which it passes at a still higher elevation than the western road. It descends into the Kárákásh River at Kizil Jilga: the greater elevation makes this road perhaps even more trying than the western route.

The third route from Gogra, before alluded to, leaves the Chang Chenmo Valley 8 miles above Gogra and the Lingzi-Thang Plain may be reached by either the Changlung Barma or the Changlung Yokma Pass, a little farther to the east, and of about the same elevation. This is the pass taken by Mr. (now Sir) Douglas Forsyth in his first mission to Yárkand. By it, the road followed by Captain Biddulph (striking the Kárákásh River at Kizil Jilga) may be joined, but a more northerly route passing over a succession of elevated plains was taken by the former mission, and the Kárákásh River was struck a few miles above Sora, at the sudden bend that the river takes when its course is turned towards the west (in north lat. $35^{\circ} 55'$) by the Kuen Luen Range. From this point the road followed the river to Sháhídála.

In addition to the intense cold, the principal objection to all three routes skirting or passing over the Lingzi-Thang Plains is the extreme elevation at which the traveller has to remain for so many marches: the cattle are exhausted by this, and too frequently suffer in addition from the pangs of hunger and thirst. These difficulties nearly brought the first mission to Yárkand to a disastrous end; and the same causes have proved, and will probably continue to prove, sufficient to deter the experienced merchant from following this road.

The older, shorter, and better known route by the Kárákorum is likely always to be preferred by the merchant even in summer; whereas in winter an attempt to traverse the Ling-zi-Thang Plains must almost always result in disaster.

From Kizil Jilga the road follows the Kárákásh River to Chung Tash (or "Great Stone"). From this point the eastern variation, taken by Captain Biddulph, follows the Kárákásh River right down to Sháhídúla, a distance of 166 miles; while the western or more direct road is only 113 miles in length; and although in the latter there are two high passes, viz., the Kárátágh (17,700 feet) and the Sugét (17,600 feet) to be crossed *en route*, yet they are neither of them difficult ones. The Sugét Pass may be avoided by going over the lower and still easier pass of Fotásh, by which the Kárákásh River is struck one march above Gulbashem. In the circuitous line from Chung-tash down the Kárákásh, the road is bad, but there is the advantage of plentiful supplies of grass and fuel which are almost altogether wanting on the Kárátágh line. The Ling-zi-Thang routes meet the Kárákorum summer route at Aktágh or at Sháhídúla according as the western or eastern variation is adopted.

At the angle formed by the Kárákásh River above Sora, when turned by the Kuen Luen Range, the traveller can proceed to Khotan direct (a distance of 160 miles, or 11 marches) by crossing the Kuen Luen Range by the Yangi or Ilchi Diwan (crossed by Mr. Johnson in his journey to Khotan in 1865), and estimated by him at 19,500 feet in height: after passing this there is another formidable glacier pass, the Naia Khan (height 18,659 feet, according to Johnson), which has to be crossed before reaching the plains. The Ilchi Diwan is said to be open for only three months in the year.

On the Kárákásh River, above Fotásh, is a camping-ground called Sumgal, from which Robert Schlagintweit crossed the Kuen Luen Range by the Hindu-tágh Pass, estimated by him at 17,379 feet high. At the top of this pass is a glacier much *crevassed* and extremely steep. It is a long and difficult march from its foot to the village of Bushia, where are numerous tents and caves occupied by Kirghiz, and supplies can be obtained in large quantities. It is eight marches thence to Khotan, and the road is described as bad. The road by the Hindu-tágh Pass can only be used by foot-passengers.

From all accounts the ordinary trade-route between Khotan and Ladákh in former years was, as at present, *viá* the Sánjú and Kárákorum Passes. The road from Khotan is that to Yárkand as far as Zanguia, whence it diverges to Sánjú Village direct. Another road from Sháhídúla to Khotan lies down the Kárákásh River, and, going over an easy pass, emerges at

Dúba,* a large village said to lie about 20 miles to the south-west of Piálma (on the Khotan and Yárkand road). The road down the Kárakásh can only be used in mid winter.

We now come to consider the extreme eastern route, *viá* the Chang-Thang or "Northern Plains." Of this road we have a survey by Kishen Sing Pundit, one of the more important geographical results secured by the Mission.†

A traveller from Leh to Khotan might follow the route by the Pangong Lake, along which the Pundit travelled, but he would more probably take a short cut from Lukong to the Mangtza Lake, following the ordinary Chang Chenmo route to Yárkand as far as the point where that road leaves the Chang Chenmo Valley. Passing up the latter, he would make his way eastward to its head, where an easy pass is known to exist leading on to the high table-land beyond. By adopting this road he would save 40 miles over the more circuitous road by Noh. From Mangtza the road lies over a series of high plateaux, varying from 16,000 to 17,000 feet in height, crossed here and there by low ridges which rise somewhat irregularly from the surface of the plain which contains numerous lakes, most of them brackish. In latitude 35° 7' north, the Pundit crossed, at a height of but little more than 17,000 feet, the watershed of a snowy range, which may perhaps be the true eastern continuation of the Kuen Luen. From the north of the pass the Kiria stream takes its rise; the road follows down it as far as Arash (16,000 feet), but again ascends to the Ghubolik Plain which (17,000 feet above the sea) connects the snowy range just alluded to with another somewhat higher range to the north. This last ridge is a buttress of the vast Tibetan plateau, and in descending the Polu stream from the Ghubolik At Diwan ‡ (17,500 feet) to Polu, a distance of 28 miles including windings, there is a fall of about 9000 feet. Polu is a small village in the Khotan district, and from it Khotan (or Ilchi) city may be reached either by the direct road (by Chihar Imám) which skirts the feet of spurs from the elevated plateau above, or the traveller may proceed down the stream to Kiria by the route followed by the Pundit.

* Dúba is shown on Klaproth's map as a large place about half-way between Zává and Sánjú.

† The only previous account we have of this road is one derived from native information supplied by Mr. R. B. Shaw, and which was published in the 'Proceedings' of the Royal Geographical Society, vol. xvi. (1872) pages 247 and 248. This account agrees remarkably well with that given by the Pundit, and every march can be followed on the large-scale map I have before me as I write.

‡ Or "Sulphur Horse Pass," so called from its being used by the Polu people when bringing sulphur to Khotan. Sulphur is excavated in large quantities from the ground near the lake in the Ghubolik Plain.

Throughout the whole of the road from Khotan to Leh traversed by the Pundit, 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 for the native merchant, to whom time is of no great value. As far as I can learn however from inquiry, it never has been used as a trade route on a large scale, the chief reason being fear of the Chang-pas* or Tagh-lik, wandering tribes of Tartars., nominally subject to the Chinese officials at Gartokh and Budokh, but probably practically only so far subject to them that they would abstain from committing violent aggression on parties travelling under the protection of those authorities. Habibúla, who was elected King of Khotan when the Chinese were turned out of the country, sent messengers to try and open up this route in 1864. They were seized by the Chang-pas and compelled to return to Khotan, with the threat that any subsequent explorers would be put to death. The inhabitants of Kiria and Polu go as far south as Ghubolik to procure sulphur. They also go west of this towards the Yurung-Kásh (or Ilchi) River, where they search for gold and jade; but it would appear that although the Khotanese claim the country up to the head of the Kiria River, as their boundary, yet practically, from fear of the Chang-pas, they never go quite so far to the south. On the other hand the Chang-pas, who probably have equal reason to fear the Turks from the plains, would appear not to wander farther north than Rikong Chumik (the ridge to the north of which separates their grazing grounds from plains on the north, through which flows a considerable stream, passed by the Pundit, asserted by his guide to be the head of the Yurung-Kásh River). It would thus appear that, owing to the mutual hostility of the two races, there is a large tract of neutral ground which is never occupied by one or the other, extending from Rikong Chumik to Ghubolik: here the Pundit saw large herds of yâk, antelope, and jungle sheep (*Oves ammon*), which had apparently never been scared by the sight of man. Near Rikong Chumik were the remains of numerous huts; others were frequently seen along the road, but fortunately for the Pundit 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.

From Noh he tried to get to Rudokh, but was not permitted to do so; in fact the inhabitants tried to compel him to return by

* Chang-pa in Thibetan means *North-man*, while the Turki name for the same people is *Tagh-lik*, i.e. *Mountaineer*.

the way he had come, and it was with great difficulty that he at last got permission to go to Leh direct. Anticipating a search by the first people he should encounter, he had, when nearing the village of Noh, concealed his instruments and papers in a bush. He was duly searched, but of course nothing was found, and he afterwards succeeded in again getting possession of his valuables. In Tibet the great difficulty encountered by persons entering in disguise is always on the frontier, where the examination is very strict. When once allowed to pass into the interior of the country there is little to fear.

The newly-acquired knowledge of this road may perhaps lead to important practical results, but not until our relations with the Chinese empire, and their too independent subordinates in Tibet, are placed on a more satisfactory footing than they are at present. It is apparent, by combining the results of this survey with other information collected by the survey Pundits during the past few years, that a road exists between the plains of Hindustan and Turkistan which entirely avoids the territories of the Maharaja of Kashmír, and which, in the summer months may be traversed without once crossing snow, or without encountering one really difficult pass, such as we know to exist on the Kárákorum and Chang Chenmo routes. Leaving the plains of India at the ancient city of Najibabad (between Hurdwar and Moradabad), the starting-point of the old Royal Road stated by Moorcroft to have crossed these same mountain systems, a good road, about 210 miles in length, and only crossing one low pass,* leads to the Niti Pass (16,876 feet high) over the main Himalayan Range. Descending from the Niti Pass due north into the Suttlej Valley, and crossing that river at Totling (12,200 feet) by the iron suspension-bridge still existing (said, according to local tradition, to have been constructed by Alexander the Great) and crossing by the Bogo La (19,210 feet) into the Indus Valley at Gartokh (14,240 feet), the road would then follow that river to Demchok.† Thence it would go over the Jara Pass due north to Rudokh and Noh, and by the newly surveyed route to Polu and Khotan.

Estimating the distance from Najibabad to the Niti Pass at 210 miles, thence to Noh at 275, and from Noh to Khotan (*viâ* Kiria) 446 miles, we have a total distance of 931 miles between Najibabad and Khotan; and this even might be considerably shortened by taking the direct road from Polu to Khotan.

[The ancient Royal road probably followed the above to the suspension-bridge at Totling, and thence to Rudokh and Noh,

* The Langar Pass, 6500 feet high, which is on the third day's march from the plains.

† A more direct route exists from Totling *viâ* Dankhar to Demchok.

whence a road now exists which passes *viâ* the head of the Chang Chenmo Valley and Nischu on to the Ling-zi-Thang plains, down the Kârákâsh River and over the Sánjú Pass to Sánjú (or Sarikia) which is half-way between Yárkand and Khotan.]

Summarising our knowledge of the lengths of the various physically practicable routes from Hindustan to Turkistan we find that the distances are:—

	Miles.
From Amritsir to Leh <i>viâ</i> Rawul Pindi and Srinagar	635
" " to " <i>viâ</i> Kangra	522
" " to " <i>viâ</i> Sealcote and Kashmir	575
" Leh to Yárkand <i>viâ</i> Ling-zi-Thang and Kârákâsh River	584
" " " <i>viâ</i> Chang Chenmo and Kârákâsh ..	527
" " " <i>viâ</i> Kârákorum Pass and Sánjú (summer route)	445
" " " <i>viâ</i> Kârákorum and Kugiar (winter route)	472½
" " " <i>viâ</i> Noh, Polu, and Khotan	839
" " Khotan <i>viâ</i> Kârákorum and Sánjú	415
" " " <i>viâ</i> Ling-zi-Thang and Ilchi Pass (Mr. Johnson's route)	437
" " " <i>viâ</i> Noh, Polu, and Kiria	637
" Amritsir to Yárkand by the road followed by the Mission, <i>s.e. viâ</i> Rawul Pindi, Srinagar, Leh, and the summer Kârákorum route	1080
" Najibabad to Khotan <i>viâ</i> the Niti Pass and Western Tibet	931

At some distant day it is not impossible that the last-named road may form the highway to Turkistan; but as long as Europeans are rigorously excluded from Western Tibet we cannot hope that this consummation will be realised.

At a meeting of this Society in June 1874, when letters were read by Sir Henry Rawlinson that had shortly before been received from members of the Mission then in Yárkand, an idea appeared to prevail that I had been able to extend the triangulation of British India to meet that of Russia. This idea was erroneous; in the first place, Russia hitherto has not carried a trigonometrical survey into its recently-acquired territories in Asia, and the mapping of their explorations in Turkistan has necessarily been based on astronomical observations taken at places of importance, which have been connected together by route-surveys of varying degrees of accuracy. This system I was myself ultimately compelled to adopt, and the whole of my mapping in Kashgharia and in the Pámirs is based on my own astronomical observations.

For a few marches from Leh in every direction the country had been in former years, correctly surveyed and mapped by

parties of the Great Trigonometrical Survey, under the late Colonel Montgomerie, R.E., but between this rigorously executed survey and the table-lands of Turkistan lie vast tracts of mountainous country, parts of which, through the enterprise, zeal, and energy of Messrs. Shaw, Hayward, and Johnson (all of them names well known to this Society), have been mapped with tolerable accuracy, while other parts have probably never yet been traversed by man, certainly not by geographers. It was my object to weld together, as far as possible, the existing materials into a harmonious whole, and to add whatever I could to existing data. It is true that at an early period of the undertaking I had hoped to be able to extend our triangulation for a considerable distance farther than it had already reached in the regular operations of the Kashmir Survey, and had the weather been more favourable, and had I had more time and means at my disposal, something might possibly have been done to this end; but as it was, owing to the antagonism of the elements, my diary shows one almost continuous succession of disappointments, most disheartening, considering that it was but the beginning of the journey, and that I did not know but that political reasons might prevent any work being done after reaching Yárkand territory. Climbing hills at the great elevation we were then at was very hard work, and of course occupied considerably more time and labour than similar ascents at a lower level; and in nine cases out of ten when one did arrive at the top of a high hill, snow and clouds entirely obscured both distant and neighbouring peaks. This cloudy weather, combined with the necessity of regulating halts and marches according to the places where supplies had been laid out, soon made it evident that it was useless to attempt a continuation of the triangulation. The length of some of the marches and the shortness of the days made the execution of a careful traverse as impossible as the triangulation, and, after some very hard work, I reluctantly came to the conclusion that nothing could be done by myself (in addition to astronomical work), but to make what use I could of the plane-table. Even with this but little was done, owing to the extremely unfavourable state of the weather; but I fortunately succeeded in fixing my position satisfactorily at two or three places on the road to Sháhídúla by means of certain trigonometrical points which were fixed years ago by the Survey Department in advance of the accurate detailed survey. Many of these points were in the main Kárákorum and Kuen Luen ranges; some of them in the heart of the *terra incognita* before alluded to.

The Survey Pundits meanwhile kept up a continuous route-survey along all the lines of march followed by myself and the

other parties of the Mission. They were unavoidably obliged to accompany the main camps, to march when they marched, and halt when they halted; and as the marches are arranged for the convenience of travellers, and not of surveyors, some of them were found uncommonly stiff and difficult to get through before dark. As the Pundits were in pairs a great part of the way, and thus able to divide the work, the ground was got over with a fair amount of accuracy; and checked and corrected by the latitude observations taken both by themselves and myself on the outward and return journeys, the routes are certainly laid down with an amount of accuracy not hitherto attained.

I should explain that the Pundits are trained to execute a traverse survey, the angles of which are measured with a prismatic compass, and the distances determined by the number of Pundits' paces. These paces have a slightly different unit of length, which is generally determined at the close of operations by comparing the total amount of northing or southing as shown by the traverse, with the true corresponding distance as determined by the difference of latitude between the starting and closing points. The Pundits are all able to take latitude observations with a sextant, and are instructed to do so wherever opportunity occurs. It is obvious that the accuracy of the survey depends upon their being able to keep up a continuous measure of the road; any break in it would ruin the work. Hence the necessity, if possible, of their working in couples, so that they may relieve each other in the pacing, especially where, as in the present case, they were obliged to accompany the large camps, and could not select their own halting-places. The days were getting short, and if darkness once overtook a man before he had concluded his work, there was every probability of his whole survey being spoiled.

To give some idea of the difficulties of surveying these mountain ranges, I may mention that, in addition to the crossing of six passes, the lowest of which is 17,600 feet above sea-level, from the day on which we reached Gogra until arrival at Sugét, a period of twenty-three days, I was never at a lower level than 15,000 feet, and during that period the thermometer seldom rose as high as freezing-point (32° Fahrenheit), whereas at night the minimum would vary from zero to 26° below zero.* Out of this time I was, for a period of twelve days, never at a lower level than 16,300 feet; while four consecutive camping-grounds were all over 17,000 feet. The highest elevation at which our tents were pitched was at Dehra Kompás camp, 17,890 feet

* i.e. 58° Fahrenheit below freezing-point.

above sea-level, i.e. more than 2000 feet higher than the summit of Mont Blanc. While I was at these great heights, one of my companions, Captain Biddulph, was travelling by a more easterly route over still higher ground, five consecutive halting-places having averaged 17,600 feet above the sea-level. It was in traversing these high lands that Dr. Stoliczka laid the seeds of the illness that ultimately lost him his life. For many days he was in a most precarious state, but after some days' careful nursing by Captain Biddulph, he apparently recovered. He subsequently encountered much hardship and exposure on our Expedition to the Pámrí and on the return journey to India, when within a few days' march of Leh, a sudden recurrence of his former malady in a few hours cut short in its prime a life that was full of promise, and lost to me a most valued friend. He was buried at Leh, where a handsome monument has been erected by the Indian Government to his memory.

In these elevated regions whenever the wind was blowing, the cold was so intense that even the natives of Ladákh who were with me used, on arrival at the top of a hill, to lie down in hollows or crouch behind stones in order to avoid the bitter blast, which seemed to penetrate one's marrow. Under these circumstances satisfactory work could not be expected, and although I kept my own health in a wonderful manner, nearly all the natives who accompanied me suffered severely. It was with no small satisfaction that Dr. Stoliczka and myself joined the envoy's camp at Ak-tágh on the 13th of October, as we knew that thence we should push on with all available speed to warmer and more hospitable regions. Our difficulties were, however, by no means over, as the Sánjú or Grim Pass, although only 16,700 feet above sea-level, was about the most difficult piece of the whole road. It was impossible for men or beasts to keep a firm footing on the icy zigzags, and many of the baggage-animals were precipitated over the snowy sides of the mountain. We lost eight mules and three ponies in the passage; while the Yárkand envoy, who followed us, left twelve horses dead on the pass.

Time does not permit me to dwell further on the mountain-ranges separating India from Turkistan. The subject has often been discussed before this Society, the members of which are also familiar with descriptions of the road across the plains of Turkistan to Kashghar, I will therefore pass on to grounds of which less is known.

At Kashghar we were most hospitably and kindly entertained by the Amír Yakoob Khan. It is melancholy to reflect on

what has occurred since the time of our visit. Yakoob, our then host, is dead, and the whole of the kingdom of which he was then in undisputed possession, extending from Tashkurbán to Turfán, is now in the hands of its former masters—the Chinese—who, as is their universal custom in the case of a suppressed rebellion, are believed to have massacred the whole of the adult population of the country.

During our winter's stay in Kashghar, while other members of the Mission were employed in negotiations, in politics, and in the study of the history, resources, and statistics of the country, my own time was fully occupied in astronomical, meteorological, and magnetic observations, and in the collection of geographical material. The results can be studied in detail in the Appendices to the Report I submitted to the Government of India.

My observations for latitude and longitude were taken with a six-inch transit theodolite, by Troughton and Simms—a capital instrument, of which we have a specimen on the table this evening. A similar one was carried with me on all my wanderings—a distance of more than 3000 miles—carefully packed and carried on a pack-saddle over the highest passes in the world, through deserts and through floods; and although I have observed with it at temperatures varying from each other by as much as 100° Fahrenheit, I have never found it work badly, and I never once had occasion to clean the axis during the whole period of my absence.

During the winter in Kashghar I was permitted to make two excursions in the neighbourhood, both of which have enabled me to add something to our geographical knowledge.

During the first of these trips, which occupied us from the 31st of December to the 10th of January, Dr. Stoliczka and myself, under the orders of Colonel Gordon, visited the Russian frontier at Lake Chatyr Kul, about 110 miles north-west by north of Kashghar. The road followed was the caravan-road from Kashghar to the important Russian military centre of Almaty or Vernoye. The road had been strongly fortified by the Kashgharians, as it was the most likely line to be taken by an invading Russian force.

I succeeded, with no little difficulty, in keeping up a continuous route survey, and took observations for latitudes at four points on the line of march, the most northerly being at Turgat Bela, on which occasion, while observing, the thermometer stood at 10° below zero (Fahrenheit), and an intensely bitter wind was blowing. Later on the same night the thermometer fell 16° lower, while inside the *akoes* (Kirghiz tent), where we slept, it was as low as 8½° below zero.

It may be imagined that taking star observations in the open, with the thermometer standing below zero, is not a very pleasant occupation. After handling the instrument for a short time, the sensation, so far as one's fingers are concerned, ceases, and during a set of observations it is necessary to rush frequently into the adjacent tent to restore circulation over a fire. The recorder, on such occasions, nurses the hand lantern with great care, and although the ink is placed inside the lantern, yet it would freeze on the pen between the lantern and the paper. I was eventually obliged to allow a pencil to be used on such occasions. My faithful Madras servant "Francis" also experienced no little difficulty in getting the lamps to burn properly. The oil becomes very thick from the cold. The air-holes had to be carefully enlarged for high altitudes, so that while admitting more air, they might still be small enough to prevent the high winds which were frequently blowing, from extinguishing the light.

We left Yangí-shahr (the new city of Kashghar), and, going northwards, crossed the River Kizyl by a good wooden bridge. On our left lay the old city of Kashghar, beyond which we crossed the River Taman. These two streams meet to the east of the town, and form the Kashghar Daria. At the time we passed there was but little water in either stream, that little being frozen, so that it was impossible to form any idea of the size of the vast mass of water that must come down in the summer time. The left bank of the Taman is covered by tanneries and cemeteries; the road enters a narrow lane between two mud walls, on either side of which are inclosed gardens, fields, and hovels. These continue for some four miles, when the road emerges on to an open stony plain forming a very gently rising slope up to a small spur from a low range of hills, running nearly due east and west, through a gap in which, formed by the River Artysh, the road passes. On the north side of the range is the wide and fertile valley of the Artysh, a name given to the whole district, which consists of several small townships scattered over the valley, in one of which we put up for the night.

Crossing the Artysh Plain the road enters the Toyanda Valley, about 2 miles wide, and here we may be said to have fairly entered the Tian Shán Mountains. In marching up this open valley we had in view to our left the sharp serrated edges of the Ming-yol Hill, a prominent object in the panoramic view from the roof of the Embassy buildings in Kashghar; in front of us lay a range of snow-covered peaks; these formed part of a small range running parallel to the main chain. A little farther on through a broad open valley we reached the

picturesque camping-ground of Chung Terek, a Kirghiz village, where were a number of *akooes* pitched for our reception. From this place the scenery gets much bolder, and the road passes between precipitous hills rising to a height of some 3000 feet above the valley, through which a march of 20 miles brought us to the Chakmák Forts, where very strong fortifications had been erected for the defence of the frontier, and where the overhanging heights are so precipitous and inaccessible that it would be almost impossible for an enemy to effect a lodgment.

There are two roads over this range of hills converging on a point a few miles north-west of the Chakmák Forts—one from the Suyok Pass, two days' journey in a north-west direction, is little more than a path, and cannot be traversed by horsemen; but the other from the Turgat Pass, about 30 miles to the north of the junction, is now the main caravan-road between Kashghar and the Russian settlement of Almáty (Fort Vernoye), and may be said to be practicable all the year round, although somewhat more difficult, perhaps, in summer, when there is much more water in the River Toyanda, which has to be crossed some forty times in the course of the journey.

From a ravine lying to the south of the Chakmák Forts a road runs across the hills to the Terekty Fort, nearly due north of Kashghar. It lies on the shortest road between the Náryn Fort (Russian) and Kashghar *viá* the Bogushta and the Terekty passes.

For 25 miles above Chakmák, the road continues gently ascending along the course of the frozen stream, passing through volcanic rocks, to Turgat Bela, a little short of which the nature of the country alters, and the precipitous hills are replaced by gently undulating grassy slopes, abounding with the "*Ovis Poli*."* These extensive grassy slopes, somewhat resembling the English downs, are a very curious feature of the country, and not only attract the Kirghiz as grazing-grounds for their cattle, but are equally sought after by the large herds of Guljar, in one of which Dr. Stoliczka counted no less than eighty-five. The weather was now intensely cold; Colonel Gordon got his fingers frost-bitten from the cold contact of his rifle, and when I stopped for a few seconds on the top of a ridge to get a view of the country, and to record the reading of my aneroid, my hands and feet became entirely numbed.

The valley had now gradually risen till at Turgat Bela we had reached an elevation of 11,030 feet above the sea. We

* The *Ovis Poli*, or guliár, as well as the ibex, abound in these hills in such large quantities that they form the principal food of the garrisons of the outposts. At Chakmák we saw a large shed piled up to the roof with the frozen carcasses of these animals.

rode thence to the Chatyr Kul Lake, and back to camp the same evening (about 32 miles). Starting early in the morning with the thermometer several degrees below zero, we rode 13 miles to the pass up a gentle ascent through a broad and open valley, until within a mile of the crest, where the slope, though still very easy, is somewhat steeper. On the left of our road was a range of lofty, bold, precipitous peaks. On our right were low undulating hills, extending away eastward as far as we could see. On reaching the pass (12,760 feet) we did not immediately see the lake, but had to advance for about 3 miles in a northerly direction, when we came suddenly into full view of the whole lake and the range of mountains beyond, a magnificent panorama. There are two nearly parallel ranges of mountains—the Turgat, on which we stood, and the Tash Rabat to the north—both portions of the Tian Shan Range, which westward, like the Karakorum eastwards, seems to lose its identity and merges into several comparatively unimportant chains, of which it is impossible to say which is the main one. The Chatyr Kul lies between these two ridges. There is no drainage out of it, but several small streams run into it. The Russian maps include the lake within their boundary, which they place on the crest of the southern or Turgat Range, the peaks and passes of which are of about the same average height as of the northern range. The Aksai River, which rises a few miles east of the lake, flows into East Turkistan, while the Arpa, which flows from a corresponding position near the west end, finds its way into the Syr Daria.

The lake is about 1700 feet below the pass.

Of course from a single view of the lake and the mountains beyond it, it was impossible to form any accurate idea as to their size, but according to the Russian maps the lake is of oblong shape, about 14 miles in length, and 6 or 7 in breadth at its widest part. The lake was covered with ice, and the sleet which lay on the surface made it difficult to distinguish its edge from the nearly level plain by which it is surrounded, which was covered with a white saline efflorescence. A single horseman near the edge was the only living object visible, a curious contrast to the Kashghar side of the pass, where, within a few miles of the crest, we had seen a herd of several hundred ponies grazing at the foot of the precipitous hills before alluded to. These animals belonged to Russian Kirghiz, who, during the winter, were allowed to graze in Kashghar territory on payment of certain fees for permission to do so.

The caravan-road which we had followed from Kashghar lay across the plain in front of us. Beyond it is the Tash Rabat Pass, about the same height as the Turgat, but somewhat more

difficult. A traveller who had crossed it in March told me that the road was then very bad, and difficult for equestrians; but I think his account must be somewhat exaggerated, as the camel-caravans from Almáty traverse it without much difficulty. Between the Russian Fort of Náryn and Kashghar, a distance of 180 miles, there are only these two passes—both about 13,000 feet in height. When we visited the country early in January there was no snow on the ground; but we were singularly fortunate, for a traveller two months later complained of a good deal of snow, while Baron Osten Sacken wrote on a former occasion that his party suffered much from cold and snow in July.

There is a shorter and more direct road between Náryn and Kashghar, said to be not more than 134 miles in length, or eight days' journey. The passes, though all about the same height, *i.e.* between 12,000 and 13,000 feet, are more difficult than on the ordinary caravan-road, and it is seldom used by traders. It is protected on the Kashghar side by the Terekty Fort. We never had an opportunity of visiting this fort, which lies nearly due east of Chakmák, and due north of Kashghar; and although we must have passed within a few miles of it during a subsequent trip in the Artysh districts, so jealous were the officials lest we should learn too much, that my guides studiously avoided pointing it out, and actually on one occasion even denied its existence. The distance between Fort Náryn and Vernoye is 180 miles by the shortest road, which goes over three passes, all between 12,000 and 13,000 feet in height.

We had hoped that we should have been able to return to Kashghar, over the undulating plateaux to the east of the Turgat Pass, and by the Terekty Fort, but we had now to retrace our steps to Kashghar by the road we had come. A notice of the return-journey is therefore unnecessary.

I may mention that I have now twice crossed the Russian frontier without a passport; the first time in a friendly manner on the expedition just described. My second visit was in September and October last year, when I accompanied the Turkish army under Kurt Ismail Pasha, and was encamped for two months in Russian territory near Mount Ararat.

Whilst our party under Colonel Gordon was visiting the Chakmák Forts, another member of the Embassy, Captain Bid-dulph, paid a visit to Marálbashi on the direct road to Aksú. An interesting account of his journey will be found in the volume of the Yárkand Reports.

My second excursion was to the north-east of Kashghar. Although only absent for a fortnight, Dr. Stoliczka and myself succeeded in traversing 340 miles of road; first of all travelling

in the Artysh districts in company with the Envoy and his party, and then making a rapid detour to the Belowti Pass, about 150 miles on the direct road from Kashghar to Ak-sú. I have no time this evening to give a detailed account of the journey.* The ground we traversed was marked on old maps as the Syrt, and represented as a high table-land, rising immediately above the plains. We ascertained, however, that it should rather be represented as a series of parallel mountain-ranges, between which, and running parallel to them, are extensive level plains, very little higher than the plateau of Eastern Turkistan, but gradually rising towards the north and sloping down towards the east. Thus the Túghamatí Plain, about 45 miles north of Kashghar, is about 2000 feet higher; while the Jai Túpa Plain, the same distance east of Túghamatí, is only 1000 feet higher than Kashghar.

These large plains have in most cases much grass and fuel, though but little water. They are inhabited by wandering tribes of Kirghiz, who live almost entirely on the produce of their flocks and herds. In the time of the Chinese these people appear to have led a more jovial life than at present. Under no master, they used regularly to levy black-mail from passing travellers and merchants at every camping-ground; and as prompt payment always insured a safe passage, there was seldom much difficulty in collecting their dues. Under the strict rule of the Amír they are now disarmed, and are comparatively poor, as they dare not venture on any of their old tricks. A single sepoy, selected from among themselves, is stationed in each encampment, and is responsible for the good conduct of its members; an annual present of a choga, a certain amount of grain, and remission of taxes, is the remuneration he receives from the State. The Kirghiz pay as taxes annually one sheep in forty, one sheep for every two camels, and one-tenth of the agricultural produce (when there is any). In these parts horses or ponies are scarce. Nature aids the inhabitants in their poverty by a plentiful supply of a plant called locally *kuruk* or *teric*, a kind of millet which grows wild, and from which they make a preparation called *talkan*, corresponding to the Ladákhí *suttoo*, which they eat uncooked, moistened with a little water. I tried some, and found it to be not unlike Scotch oatmeal, and, as it may be had for the picking, it may be looked upon as a bountiful gift of Providence to these otherwise poverty-stricken people.

The Artysh Valley, which we passed through on our way to the Syrt, is a much richer and more populous country. We

* The reader who seeks more information on this subject is referred to the volume of the Yárkand Reports, pp. 253-261.

had already passed through its western extremity *en route* to the Chatyr Kul Lake, and we found the village of Altin Artysh partaking of the same character as nearly all the villages we have seen in East Turkistan, consisting of a number of small hamlets, scattered about the plain, at intervals from each other varying from a quarter of a mile to a mile. Each hamlet consists of a number of scattered farm-houses, each farm having its separate irrigation-canal, its trees, its fields and out-houses, and forming the residence of a family, containing generally from four to a dozen souls. In a central position is the bazaar, with long rows of stalls on both sides of the road, somewhat resembling that of an Indian village, but absolutely untenanted except on the weekly market day. Altin Artysh consists of 9 hamlets, containing about 3000 houses.

The one difficulty throughout East Turkistan is want of water, and one cannot help admiring the ingenuity with which the inhabitants have made the best use of the scanty supply of this precious fluid. Where there is a sufficiency, the country is one close network of irrigation-channels, and in the spring, in these places, one unbroken mass of trees and verdure testifies to the excellence of the system. In the Artysh Valley there is water in moderation, and, as far as I could learn, nearly every drop available in the spring and summer is used in irrigation. In the winter, one sometimes comes across tracts of marshy land, but these are generally caused either by springs which rise in the neighbourhood, or by leakage from canals in autumn, at which time the water is no longer required for irrigation, and the saline nature of the soil causes breaks down, and consequent leakage, which it is not considered worth while to repair until the following spring.

We had rather a rough time of it on this journey, and on one occasion, having unwisely gone ahead of our baggage, we did not reach our intended camp till dark, after a march of fully 32 miles, through a very heavy sandy road, which so delayed the mules carrying our baggage that they did not arrive till eight o'clock the next morning, having stopped over night exhausted in the jungle, about 5 miles short of our camp. Fortunately, we found an old Kirghiz Musjid, in which we went dinnerless to bed, protected, however, from the wind, and from the snow which fell during the night. The officials at the headquarters' camp had assured us that we should find Kirghiz and supplies at this place, but there were neither one nor the other, and the Diwan Begi, who accompanied us, spent his whole night (after his day's ride) in hunting up Kirghiz, with whom he returned about daybreak, bringing supplies for man and beast, both of whom had fasted for at least twenty-four hours.

The cold, too, was sometimes intense. At one place the thermometer outside the akooe stood at 16° below zero when I rose in the morning. This great cold was, I think, in great measure attributable to the presence of saline matter in the soil, for our elevation was not much over 1200 feet above Kashghar, where the corresponding temperature was very much higher.

The furthest point we reached on this journey was the Belowiti Pass, on the range that separates the large grassy plateaux we had been traversing from the valley of the Aksai, or Kokshal River, which, rising east of Chatyr Kul, flows nearly due east to Úsh Túrfán and Áksú. The Pass is 11,500 feet above the sea. From it no high peaks were visible, probably none rising more than 1000 feet above the Pass. The neighbouring hills were undulating and grassy, very much resembling those to the east of the Turgat Bela Pass, in the same range. It was evident that this range, as it advanced eastward, became considerably lower both as regards its peaks and watershed. Like the smaller ranges at its base, and parallel to it, I believe it to get lower still as it passes further east, and at last to be lost in the plains near Áksú.

As the result of this journey many considerable alterations were made in the then existing maps, which proved utterly useless. The country we traversed had never been previously travelled over by a European, and I have had to shift the position of the large town of Áksú 40 miles to the east of its place in former maps.

Shortly after our return to Kashghar from the Artysh districts, arrangements were made with the Amír by Sir Douglas Forsyth for the despatch of a party of the Mission to Wakhán—an eastern dependency of the Amír of Afghanistan.

Although our journey was a very hurried one, and necessarily performed at a most unfavourable season of the year, we were most grateful for the opportunity afforded us of visiting a country which has never been travelled over by a European since the days of Marco Polo and Benedict Goetz, and to which in the eyes of modern geographers an almost sacred interest has been made to attach by the accounts of ancient and mediæval travels which Colonel Yule and Sir Henry Rawlinson have so prominently brought before the public.

This little known country has always been the great barrier between Eastern and Western Asia—and as in ancient days it separated our Arian ancestors who inhabited the valleys in its western slopes from the Turanian races, who originally came from the plateaux of the Tian-Shán, so even now we find in the valleys of Wakhán and Badakhshán, and other hill countries

at the sources of the Oxus, that the language spoken is nearly akin to Persian; while on the eastern side of the mountains, the language spoken is a very pure dialect of Turkish, which also is the language spoken by all the Kirghiz nomads that we encountered in the Tian-Shán, north and north-east of Kashghar.

Karl Ritter has described those Pámír regions as "the most remarkable point of the whole world as regards the history of humanity." All I can do in the short space of time that remains is to give a brief account of what we ourselves saw.

Our party consisted of Colonel Gordon, Captain Biddulph, the late Dr. Stoliczka, and myself. We left Yangi Hissar on the 21st March 1874. Our first day's march brought us to the foot of the mountains, although the characteristic haze which often envelopes the Turkistan plains for days on end, had for some days previously entirely obscured the said mountains from view. This haze stuck to us most persistently for several days, and we only left it behind us on the fifth day, on crossing the Kaskasu Pass, 12,930 feet above the sea-level. Our road to this point lay continuously up the Valley of the Kinkol River—sometimes narrowed and hemmed in by almost perpendicular rocks—sometimes opening out into level tracts covered with grass and brushwood, and inhabited by Kirghiz tribes, who spend the winter in these lower valleys, and rise gradually to higher ground as the summer advances. On the day we crossed the pass there was a great deal of deep snow both on it and on the grassy slopes on either side. Although the march was only ten miles, the baggage ponies did not arrive in camp until late in the afternoon, owing to the slippery and dangerous descent on the south side, where our loads had all to be transferred from our ponies to yâks, supplied by the Kirghiz for the purpose.

These yâks, or mountain oxen, are wonderfully safe and sure-footed in crossing snow and ice; and one feels far more confident on the back of a yâk than even on one's own legs.

The view from the pass was very limited, and disappointing, and the deep snow prevented my leaving the road to try and get a better.

On the sixth day we had another pass to cross, 13,130 feet in height, and bearing the appropriate name of Torat, or Horse's Sweat; the ascent on one side being a very steep one, of 3000 feet, the fall on the other side being 4000 feet. While we were on the top the sky was cloudy, and a fall of snow obscured the peaks to the north. On the return journey, however,—five weeks later—the ground being then free from snow, I ascended a hill north of the pass, and had a good,

though limited, view in every direction. The ground rapidly rises to north and north-west; peaks in the neighbourhood rising to 17,000 or 18,000 feet.

The two mountain ranges we had now crossed, as well as a third which we traversed two days later, were, as far as I was able to form an opinion, spurs from the Kizyl Yart Range to the north. The streams passing between them flowed in a south-east direction, ultimately falling into the Yárkand River. The mountains are bare and unproductive—grass lies on the tops of the more undulating hills, while stunted birch and willow, and occasional juniper-trees are the only produce of the valleys. The road throughout was bad, and after passing the Torat Pass execrable. In one place it followed the bed of the stream—over large boulders, and deep holes of water—vast perpendicular rocks almost closing in the valley on both sides. A few determined men might here defend the road against an army. In the winter this passage is easier; but when we passed we had the double difficulties of ice and water to contend with. In summer the road is rendered quite impassable by floods from the melting snow, and an alternative road is then taken over the mountains, which in winter is covered by deep snow.

After the passage of the third, or Chickiklik Pass, 14,480 feet, our road descended the stream from the pass to its junction with the Tashkurghán River at Shindi, a small village of fifteen houses, situated in a well-cultivated valley, about two miles long by one broad. The road then passes up along the right bank of the Tashkurghán stream through a very wild defile of crystalline rocks, which forms almost perpendicular banks about 2000 feet in height, along which the river winds its way with a most tortuous course. After traversing these mountains for about 10 miles, the road suddenly emerges on to the Sarikól, or Tashkurghán Plain; a few miles farther on, over a broad open valley, and we reached Tashkurghán, or the "Stone Fort," the residence of the governor of the district.

We had now been travelling for ten days through the wild, sparsely inhabited mountain masses which lie to the west of the Turkistan plains, and found ourselves on a large open grassy plateau, some 10,500 feet above sea-level, surrounded by mountains, and well watered by a large stream flowing down it from the snowy range visible some 50 or 60 miles to the south.

This Tashkurghán Plain, or rather valley, extends apparently from the feet of the Hindu Kush passes on the south, up to a low ridge some 8 miles north of Tashkurghán. This ridge

separates the plain from another nearly equally extensive plain, that of Tagharma, on the north. The average breadth of the former is about 4 miles; and it, as well as the Tagharma Plain, is bounded on east and west by continuous ranges of snow-covered mountains.

On our return journey I was able to lay down the borders of the northern plain with considerable accuracy. Practically, the two form one large plateau, divided in the middle by a low range of hills, through which flows the Tagharma River. The northern plain extends from the dividing ridge for about 12 miles in a north north-westerly direction; it then narrows, being nearly closed up by spurs running down from the mountains, east and west. About 10 miles west of this point is the Birdash Pass, over a range which divides this plain from another similar one, that of Ak-Tásh, or Aksú, which runs nearly parallel to it. Opposite the Birdash Pass the plain again widens and extends, gently undulating for some 8 or 10 miles farther in the same direction. According to the statement of the Kirghiz, it continues right up to the neighbourhood of the Kizyl Yart Pass, which separates it from the Alai, and the Valley of the Surkhab River, the most northerly tributary of the Oxus.

Tashkurghán was once upon a time a flourishing Tajik settlement under a hereditary ruler of its own—one Alif Beg—who used to pay a nominal tribute to the Chinese, and receive in return valuable presents in bullion, which were regarded as a subsidy for the military protection of the frontier and of the road to Badakhshán. In 1868, some years after Yakoob had seized the throne of Kashghar, he invaded this country and carried off nearly the whole of the inhabitants to Kashghar; partially replacing them by Kirghiz, on whom he thought he could place more reliance. A few hundreds of the original inhabitants had recently been allowed to return, and I heard many a heart-rending tale of their woes and sufferings. The villages have nearly all tumbled into terrible disrepair; as the comparatively few Kirghiz who dwelt in the neighbourhood preferred their felt tents to more settled habitations.

A garrison of some 300 soldiers hold the place on behalf of the Amír Yakoob. They reside in the fort, which is of very ancient date, said to have been founded by Afrasiab, the King of Turan. The "Takhsobai," or Governor, evinced so great a disinclination to receive our visit that we had to content ourselves with inspecting the fort from a distance.

The Tagharma Plain to the north presented a very lively spectacle: fully 100 Kirghiz tents were in view, scattered about in different parts of the valley; their tenants, of the Sark or Syok tribe, being subjects of the Amír of Kashghar. Open,

grassy, well watered, and speckled all over with camels, yaks, horses sheep, and goats, it formed a pleasant sight after the wilds through which we had been wandering, and was a striking contrast to the Tashkurghán Valley, which looked by comparison a picture of desolation, owing to the numerous uninhabited villages and tumble-down houses with which it was covered.

The Tashkurghán Valley is for the most part stony; but there are patches of cultivated land here and there along the banks of the stream which runs down from the Kunjad Mountains. Barley is grown sufficient for the wants of the present small population, which certainly does not exceed 2000 souls, and the country could probably produce much more than it does. There is good grazing ground near the river; a few poplars and willows are scattered over the valley.

From Tashkurghán to Panjah there are two roads commonly used by merchants; the one over the Little Pámír was taken by us on our outward journey. It is the ordinary winter route; the other by the Great Pámír was used on our return. The latter is the easier road in summer; it passes over much higher ground, and is impassable for caravans in winter on account of the deep snow which lies on it.

The road through the mountains to the west of the Tashkurghán Valley, lies up a rocky stream. On the second day's march the valley opens, and we entered a large basin with lofty mountains towering above it on all sides, very bold and precipitous, and of a very peculiar and striking ferruginous colour. A stiff pull through the snow to the top of the pass (14,915 feet), and we were standing on the watershed between Eastern and Western Turkistan.

I had been given to understand that we should here come in view of the "Pámírs," and was somewhat surprised at seeing in front of me nothing but a long range of low red-coloured hills about 10 miles distant, a portion of which to the right was pointed out to me as the Great Pámír, and another on the left as the Little Pámír. Nothing was visible but an irregular mass of hills whose serrated tips did not appear to rise more than 1000 feet above the pass on which I was standing. We were separated from these hills by a large valley running in a northerly direction, which subsequently turned out to be that of the Ak-sú River, the principal source, as now appears, of the Oxus. The apparent continuity of the range in front of us was, as we shall hereafter see, a delusion; the hills really form the ends of broad transverse ranges, running a westerly direction, and separating the various Pámír valleys, which were concealed from our view by the low hills in front.

Descending from the Neza Tash Pass a march of a few miles in a westerly direction, through heavy snow, brought us to our camp. On the following day we descended into the valley of the Ak-sú, a little north of Ak-Tásh, at an elevation of 12,600 feet above the sea. We continued south for 6 miles up the valley, which was here about 2 miles broad, and deep in snow. In front of us was a fine range of snow-covered peaks, running in a direction a little south of west, forming the southern boundary of the Little Pámír, which occupies the upper portion of the Ak-sú Valley. The latter, as we advanced, gradually turns round south-west and west-south-west, which direction it retains up to and beyond the lake of Little Pámír. This Ak-sú Valley, when it runs north and south, forms the well recognised boundary between Kashghar and Wakhán.

The Little Pámír is generally considered to commence near where we struck the Ak-sú stream, and consists of a long, nearly level, grassy valley, varying from 2 to 4 miles in breadth, and inclosed on either side by ranges of snow-covered hills, sloping down rather gently towards it. Its length from east to west is about 68 miles. The Great Pámír, and all other Pámírs are, as far as I could learn, of precisely similar character. The ground intervening between the Great and Little Pámírs, is filled up with lofty mountains of tolerably uniform height, and without any very conspicuous peaks, the hills to the west near the junction of the two main branches of the Panjah River being perhaps the highest. Our first halt in the Little Pámír was at Onkul, after a march of 25 miles for a great part of the way over snow, and with such a very bitter wind blowing in our faces, that it was almost impossible to keep our eyes open. After entering the long straight reach above the turning, near Ak-Tásh, several large open valleys are passed on the north, where the hills are comparatively low and undulating, those on the south side being generally much higher.

Our second day's march through this Pámír took us along an almost level road for 24 miles. As on the previous day, snow-covered mountains lay on both sides as we advanced, and there was a great deal of snow in the valley itself, which varied in breadth from 2 to $3\frac{1}{2}$ miles. There was often much saline matter in the soil, and where this was the case the snow generally melted long before it did so elsewhere. Our camp was on the north edge of the Little Pámír Lake, to which the Wakhs generally give the name of Kul-i-Pámír Khurd, or lake of Little Pámír, while the Sarikólis and Yárkandis call it the Oi Kul.

As some doubts had been expressed, as to the supposed double exit from this lake, I was naturally very anxious to determine the point, and in ascending the valley on this day's march, I took,

at some twenty different points, observations with an aneroid barometer to determine, if possible, the exact watershed, which from previous accounts I had fully expected to find at the east end of the lake. The ground, however, was so level for several miles, there being a rise of only 230 feet in the 24 miles between Onkul and the lake, that the aneroid was not sufficiently delicate for the purpose, and although I walked for a considerable distance on the frozen stream to enable me to satisfy myself on the subject, I arrived in camp on the banks of the lake *reinfectâ*. The following morning I walked over the lake to its east end, which from a little distance off appeared entirely closed, but on walking round the head to make certain, I was soon undeceived by coming across a very narrow outlet, about nine paces across, and only a few inches deep, all ice of course. I then walked several miles on the ice down the stream (east) until I became fully convinced that its bed did slope to the east and drain into the Ak-sú. This result being contrary to what I had anticipated, I then rode to the west end of the lake to see whether (as has always been supposed) a stream issued from that end also. I left my horse and started on foot to go round its head; the ice at this end, instead of being firm and strong, as at the other, was very brittle and would not bear my weight, so I had to wade through the heavy snow and slush on its banks. I soon came across a warm spring, from which water was decidedly flowing due east. A little farther on I encountered a frozen stream, on going along which westward the barometer showed that I was walking up hill. I advanced still farther, hoping to get completely round the head of the lake, so as to be *quite certain* that there was no outlet draining westward; but the walking in the deep snow at so great an elevation had completely exhausted both myself and the man who was with me, and it was with some difficulty that I got back to my horse, and hurrying on with no guide but the tracks in the snow left by the rest of the party, it was with great difficulty that I reached camp, 20 miles from the lake, shortly after dark, one of the hardest day's work I ever did. On the return journey, the native officer of our escort came back by this road, and, according to a promise he had made me, rode completely round the head of the west end of the lake up to the foot of the steep mountain rising on the south side. The snow was then all melted, and water was flowing *into* the lake from the two sources I have just described, and nothing was flowing out. He then went to the east end, whence a stream was flowing towards Ak-Tásh, so this problem has been solved in a somewhat unexpected manner. The lake has only one outlet, and that eastward, and its waters flow into the Ak-sú, afterwards the Murgháb, which joins the

Oxus near Wámur, and is in all probability the longest branch of the Oxus.

I have tried hard to discover the true onward course of this Ak-sú River. On our return journey we struck it some 14 miles north-north-west of Ak-Tásh. It flows thence in a northerly direction for 12 miles, and then turns off out of sight north-west. It is said to flow in a northerly direction for two marches (say 40 miles) from Ak-Tásh, after which it either joins, or becomes, the Murgháb River, changing its course westward and flowing through the Sariz Pámír to Shighnán. It passes through Bartang, a district of Roshán, and joins the River Oxus just above Kila Wámur, the chief town of Roshán.

The Little Pámír Lake is 13,200 feet above the sea-level. For a length of $3\frac{1}{2}$ miles it is from 1 to $1\frac{1}{2}$ mile wide; the eastern portion, about $1\frac{1}{2}$ mile long, is very considerably narrower. Nearly opposite the south-east corner, in a side ravine, is a large glacier which drains into the Ak-sú stream shortly after the latter emerges from the lake.

The road passes along the north side of the lake and crosses the watershed 2 miles beyond the west end, at a height of not more than 150 feet above the margin of the lake. Other parts of the watershed, which is nowhere well defined, are probably still lower. The descent beyond is somewhat rapid. We went for about 7 miles down an open valley (crossing several small streams flowing down large open ravines on the north), and reached some deserted Kirghiz huts and tombs called Gombazi-Bozai, close to where a large stream, the principal affluent of the Sarhadd branch of the Oxus, comes in from the south-east.

After passing Gombaz our path lay on the right bank of the Sarhadd stream, where we met with a constant succession of steep ascents and descents. The regular path had often to be quitted in order to avoid drifts of snow, which in places lay very deep. In the winter, when the stream is completely frozen over, its hard surface makes a capital road, which is always used by travellers. We passed at a bad season of the year, too late to be able to keep to the ice with safety as it was now breaking up, and yet before the snow on the upper road was melted. Later on in the hot weather, the lower road becomes altogether impracticable, as it is impossible to cross the then swollen river. Crossing mountain streams in flood is no child's play.

Our road now lay down the main valley, and continued along its northern side over a constant succession of ascents and descents, passing occasionally through snow in deep patches. We saw on the hill-side a large number of juniper-trees, and in some of the side ravines were birch-trees and wild

roses. In fact, wherever water trickled down there were signs of vegetation, but everywhere else the hills were bare. In one or two places the road descended to the river-bank; in places the stream was entirely frozen over, the water flowing underneath, elsewhere it was altogether clear of ice. At two or three such places I estimated the breadth to be about 40 feet, depth 2 feet, and velocity $2\frac{1}{2}$ miles per hour, temperature of water 35° . Before reaching camp was a very steep descent, having a fall of over 1000 feet, which it only took a quarter of an hour to walk down. The river is here called by various names, Kanjúd, Sarhadd, Panjah, and *Hamun*. The last name I have heard more than once, and it is of course the same as "Amú." Wakhán seems to be but little better off than Eastern Turkistan in the numerous names borne by the same river. On our seventh day's march we had to cross the main stream many times where it passed through very steep hills. We crossed generally over ice and snow bridges. At last we emerged into a large open gravelly plain, watered by several streams, and arrived at the village of Sarhadd, the highest inhabited village of the Wakhán valley, and situated about 11,000 feet above the sea. The march was only 11 miles, but difficult. We were here met by Ali Murdan Shah, the eldest son of the Mír of Wakhán, who had marched out from Kila Panjah to meet us. Next day we took a very short march of only 4 miles to the large village of Patuch or Patur. This march was, while it lasted, the most trying I have ever experienced, owing to the intense bitterness of the cold wind and drifting snow which blew in our faces the whole way.

From Patuch to Kila Panjah, the residence of the Chief of Wakhán, there is not much of geographical interest to notice. The road, about 50 miles in length, lay along the valley of the Sarhadd stream, sometimes on one side of it, sometimes on the other. The valley was bounded on both sides by lofty and generally precipitous mountains, of whose height it was impossible to form any idea, as their tops and the greater part of their sides were always wrapped in clouds and mists. It was perhaps fortunate for me that for fear of exciting suspicion I was unable to use my instruments, as I know nothing more disheartening to a surveyor than proceeding for days down a valley under such circumstances. Villages were scattered all along the road on both sides of the stream. In the whole distance from Sarhadd to Panjah there are probably about 400 houses, and their corner turrets, like those in the Sarikól Valley, are evidence that the inhabitants have not fallen upon much easier times than their neighbours of Sarikól. The houses are not so good as those of Eastern Turkistan, and are apparently especially

designed to keep out the wind, which seems always to be blowing violently either up or down the valley, generally speaking from west in the morning, and from east in the afternoon. On entering a house one generally passes through the stables, containing two or three horses or cows, after which one traverses a long, winding, narrow passage, which leads to the centre of the house, which is generally very small and dirty. In the centre is a fire-place, a kind of globe-shaped stove, about 2½ feet in diameter, made of mud, and open in front for the passage of air and fire-wood. Above is a hole in the timber roof for ventilation. The roof is dome-shaped, supported on cross-beams resting on timber uprights, which surround the central fire-place, and help to support the side apartments which all open inwards towards the fire and to one another. Here the different members of the family reside. The larger portion of the house is given up to the females, who, somewhat bashful but good-humoured, appear to have a very good idea of keeping the men of the household in decent subjection. The males all wear brown woollen *chogas* or cloaks of country make; *pubboes* or boots of the same kind as are worn by the Ladákhis; loose trousers of the same material as the coat; and a generally scanty cotton turban; the almost universal colour of which is blue and white. The women, who are not over good-looking, but are pleasant and matron-like, dress very much like the men, and have long plaits of hair falling down the sides of their heads. There is no artificial modesty or attempt to conceal their faces. In a cottage where we took refuge, the females remained present the whole time we were there, and made some most excellent barley bread for us, kneading the flour into a cake which they plastered into the inner wall of the oven; after frequent turning a capital result was secured. Their physiognomies are very divergent, most of them have Jewish noses, but one boy I saw with a most perfect Greek profile. They all age very early, and attribute their grey hairs to the poverty of the country. The men seem affectionately disposed towards the females, always handing them fruits, sweetmeats, or any little trifles we might happen to give them. They are all poor: money and ornaments seem almost unknown, and hardly anything is seen in their houses that is not the produce of the country.

In many places along the valley, tributary streams have brought down immense quantities of stones and *débris*, which threaten to block up the main stream. This *débris* generally spreads in a fan-like shape from where the tributary stream opens into the main valley, and causes the river to flow round the base of the fan. At Bábátangi the valley, which from Sarhadd had varied from 3 miles to 1 mile in width, is confined by

precipitous mountains to a breadth of about one-third of a mile. It soon expands again, however, and shortly after leaving Sas (about 13 miles above Panjah) it enlarges considerably, and gradually opens out into a considerable plain, being joined a few miles above Panjah by the valley containing the stream from Great Pámír. Before the junction the Sarhadd stream passes for several miles through rather dense jungle composed of red and white willows.

On our march into Zang (near the junction of the streams) we crossed the river of the Great Pámír, here about 30 feet wide, 1 foot deep, with a velocity of about 3 miles per hour. It was very considerably smaller than the river we had followed from Sarhadd. Where the streams meet, the valley is about $3\frac{1}{2}$ miles wide and almost entirely covered with jungle. It narrows gradually towards Panjah, where it has a breadth of 2 miles. The height of Panjah above the sea I found to be but little more than 9000 feet. The vegetation in the valley was very backward, much retarded doubtless by the violent winds which tear up and down with a bitterness difficult to imagine, unless they have been felt. The grass was beginning to show signs of sprouting in the middle of April, and the cultivators were then commencing to turn up the soil preparatory to sowing. The Oxus River flows on the north side of the valley, and on its left bank is Panjah, between which and the mountain range to the south, a distance of nearly 2 miles, the ground is almost completely covered by fields, irrigated by a stream which issues from a large ravine on the south, and is derived from a large glacier which entirely blocks up the valley in which it is situated, and whose foot merging into a snow-bed, is not more than 1000 feet higher than the Oxus Valley.

At the head of the ravine containing this glacier are some snowy peaks, about 6 miles to the south,* which I estimated to be between 17,000 and 18,000 feet in height; they appeared to be on spurs of the Hindu Kush Range. It was most annoying being shut up at the bottom of a deep valley, and unable to get a nearer view of these peaks; but there was no help for it, the ravines entering the main valley from north and south were generally inaccessible, the one on the south being, as I before mentioned, blocked up by an enormous glacier, which was quite impassable, while those on the north are almost vertical chasms which looked as if the mountain had been split up by an earthquake. During our stay at Panjah, I ascended the mountains

* Their exact distance I was unable to determine, as they could only be seen up the ravine, which is too narrow to permit of a base being measured across it of sufficient length to enable an accurate estimate to be made of the distance of the peaks.

to the north to a height of about 3000 feet above the valley only to find that I was on the lower portion of a much higher range behind, which obscured all view farther north, while the hills to the south of the Oxus were so high, that they intercepted the view of any peaks on the main range of the Hindu Kush that might otherwise have been seen beyond; in fact I could see very little more than from the ground below. On the only other fine day that we had during our stay at Panjah, I went down the valley for about 12 miles, but saw little more than one or two peaks of the range to the north.

Panjah itself is, or rather was, built on five small hillocks, hence, perhaps, is derived its name* from the place, and not the place from the river. These five hillocks are situated near each other on the left bank of the stream; the largest is covered by a fort, the residence of the Mír, Fateh Ali Sháh, and most of his followers; another is of nearly equal size, covered by houses, and surrounded by a strong wall; on two others are small fortified buildings, while on the fifth there are nothing but ruins and graves. These fortified buildings (in one of which resides Alif Beg, ex-ruler of Sarikól) from their near proximity to each other, and commanding situation, form a position of considerable strength, and might hold out for some time against an attacking force unprovided with artillery. The Mírs of Wakhán have more than once held out in this stronghold against the forces of the Ruler of Badakhshán to which country they are subject. The whole population of Panjah does not exceed a hundred and fifty souls.

* "Panj" is the Persian for "five." One possible derivation of the word Panjah is given above. Some authorities would derive the word from the five rivers which are supposed to form the head-waters of the river on which Kila Panjah stands. There are two objections to this theory :—

1st.—It is contrary to the custom of Turkistan to name a place after a river, and to a hundred cases that I know of where the converse holds good, i.e., a river named after a place on its banks, I do not know a single instance of a place being named after a river.

2nd.—The word is usually pronounced *Panjah*, which is nearer in sound to the Persian word "Pinjah" or fifty. The true origin of the word I believe to be from the Panjah or *palm* (of the hand) of Hazrat Ali (the son-in-law of Muhammad). In a building on a small hill about two miles to the south of Kila Panjah is a stone bearing the impress of a hand. Local tradition says that when this country was in the hands of the Zar-dushtis, or atash-parast (fire worshippers) the people were converted to the religion of Muhammad by a visit (in the spirit) from Hazrat Ali, who left his mark on the stone as thus described, which is an object of religious veneration in the neighbourhood. At Bar Panjah in Shighnán is a similar mark over which the Fort "Bar Panjah," "over the Panjah," has been built. Possibly this tradition has something in common with that which attributes the derivation of the word Pámír to "Pa-e-Mír," i.e., the foot of the Mír Hazrat Ali. I would myself be inclined to derive the word from "Pam," the Kirghiz word for roof, and "yer," which is both Turki and Kirghiz, for "earth" corresponding to the Persian word "Zamín." Bam-i-dunya or "roof of the world" is a name by which the Pámír is well known.

The district of Wakhán has been described by former travelers. It comprises the valleys containing the two heads of the Panjah branch of the Oxus, and the valley of the Panjah itself to Ishkashím. The northern branch of the Panjah has its principal source in the Lake Victoria in the Great Pámír, which, as well as the Little Pámír, belongs to Wakhán. Both of the Pámírs were thickly inhabited by Kirghiz in former years, subject to Wakhán, but they are now unoccupied, the constant feuds between the Shighnis, the Wakhis, the Kirghiz of the Alai, and the Kunjudis, having rendered the country quite unsafe. The highest inhabited village in the northern valley is Langar Kish, only a few miles above the junction, and on the right bank of the stream. The Sarhadd Valley (the southern branch) is inhabited from Sarhadd downwards, and there are villages scattered along the banks of the Panjah River down to Ishkashím. Wakhán is divided into four "sads" or hundreds, *i.e.* districts, and contains an estimated total of 550 houses, and a population of about 3000 souls.

I must now describe the work of the *Múnshi*, an assistant surveyor, who accompanied me from India, and who left our party at Kila Panjah, and followed the course of the Oxus through Wakhán for 60 miles to Ishkashím, thence turning northwards he followed the same river for nearly 100 miles further, passing successively through the districts of Gháran, Shighnán, and Roshán, countries which have hitherto only been known to us by name. He ultimately returned to India *viá* Kabul.

The small State of Ishkashím forms, together with Zebák, one of the numerous petty feudal States tributary to Badakhshán. The present ruler of both these small districts is Sháh Abdul Rahim, a Syud of Khorassán, who was placed in power by Muhammad Alum Khan, the late Governor of Balkh. The present territory of Ishkashím extends for about 16 miles to the north of the village of the same name, which contains about forty houses, and consists, as is generally the case in those parts, of numerous scattered farms. There are small villages throughout this district on both banks of the Oxus; Sumchún and two others on the right bank, and Yákh-duru and Sar-i-Shákh on the left. These belonged to Sad Ishtragh, which was once a separate principality, but is now a district of Wakhán.

The road from Ishkashím runs along the left bank of the river up to 6 miles beyond Sar-i-Shákh, where the river is crossed by an easy ford. In the month of May the water flowed in a single stream, which was $3\frac{1}{2}$ feet deep, and about 200 yards in width. In summer it is impossible to cross the

river at this point, and a very difficult path leading along the left bank is followed. Down to it the valley is open, 4 or 5 miles in breadth and richly cultivated. The ford marks the boundary between Ishkashím and the district of Kuche Gháran or "narrow caves," which has been for centuries famous for its ruby mines.

The Gháran country extends along both banks of the Oxus for about 24 miles, and was once upon a time rich, flourishing, and populous. Remains of large villages exist on both banks, and bear witness to the oppression that has been exercised by successive Governors of Badakhshán. The fields near these deserted villages are now cultivated by the inhabitants of the neighbouring districts of Rágh and Sar Gholám, subordinate to Badakhshán, and said to be distant from the river a long day's journey, and separated from it by a range of hills which runs parallel to and on the left bank of the river.

The first of these large deserted villages is about 4 miles below the ford, and is called Barshar. A little beyond it a large stream enters the Oxus from the east, deriving its name, the Boguz, from a village of some thirty houses situate 10 miles up the stream. From this village a road goes to the Shákh-darah district of Shighnán. Near the junction of the Boguz with the Panjah, the road crosses to the left bank of the river. Nearly opposite to Barshar is a ravine by which a road goes over the Aghirda Pass to Faizabad, the chief town of Badakhshán. This road is said to be open all the year round. Throughout the remainder of the Gháran district, numerous ruins are passed on both sides of the stream, the largest of which, Shekh Beg, on the right bank, must formerly have contained about 200 houses. On the same side of the river, some 16 miles below Barshar, are the celebrated ruby mines, once the source of considerable wealth to the Rulers of Badakhshán, but now apparently nearly exhausted. These mines have, until lately, always been worked for the immediate benefit of the Governors of Badakhshán. At the present time some thirty men are employed there. It was said that during the past year one large ruby, about the size of a pigeon's egg, was found, and sundry smaller ones; the whole of them were sent to the Amír.

The rubies are found in a large cavern, to which there are three entrances, situated about 1000 feet above the river, and about a mile up the hill-side; the task of excavating appears to be not unattended with risks, as three workmen were recently killed, having fallen from the rocks while searching for the precious stones. There is a peculiar kind of soft white stone which is found embedded in the harder rock, and in this the rubies are found. In former years the inhabitants of Gháran,

Lead and all the materials employed in the manufacture of gunpowder are found in the country. The valley at Bar Panjah is about 4 miles wide, and contains a great many houses and gardens. The river runs in numerous channels separated by jungle covered islands. Short punt-shaped boats, similar to those in Central India, are used at the ferry. In July and August, when there is much water in the river, all travellers have to cross at Bar Panjah, to the other bank, the road on the left bank being then impracticable.

In its passage through Shighnán, the Oxus receives two considerable affluents on the left bank, the Shewa and Vacherv Rivers. The former is crossed by a good bridge, and was about 25 yards in width, and unfordable, when the Múnshi passed in May. It flows from a lake in the Shewa Pámír, a favoured pasture ground much frequented by herds of horses, sheep, and cattle from Badakhshán. The owners of these flocks are said to make payments to the King of Shighnán for the right of grazing there. The Vacherv River is about the same size as the Shewa stream, and joins the Panjah to the south of Bar Panjah. Along it lies a much frequented road from Shighnan, over the Shewa Pámír, to Faizabad.

On its right bank the Oxus receives one very large river, the Suchán, formed by two large streams, the Shákhdarah and the Ghund, which unite about half a mile before joining the Panjah. The two branches are of about equal size, and the united stream is about two-thirds of the size of the main river, which continues to be called the Ab-i-Panjah. The Suchán stream enters a few miles south of Bar Panjah. The valley opens opposite the junction to a width of about 4 miles, forming a beautiful well cultivated plain, with a good deal of pasture land, generally covered with horses and cattle from Bar Panjah, which place forms a most picturesque addition to the landscape, situated as it is on a white rock surrounded by trees and gardens, which extend uninterruptedly a distance of about 2 miles north of the fort.

Both the Shákhdarah and the Ghund rivers have numerous villages on their banks. On the former, at two days' march from Bar Panjah is the large fort of Rách, the residence of the Governor (Hákim) of the Shákhdarah district, which is said to contain about 500 houses. The Ghund Valley, the chief place on which is Chársím, is said to contain about 700 houses. Roads lie up both these valleys to the Pámír steppes. The Pámír at the head of the Ghund Valley goes by the name of Bugrúmál, and is possibly a continuation of, if not identical with, the Alichúr Pámír. The direct road to Kashghar up the valley is said to be a much easier road than that by Tashkúrhán.

tunnel, which is excavated through solid rock, and is about 100 paces in length, and so narrow and low, that it is impossible for a loaded horse to traverse it. The tunnel is said to have been constructed some three hundred years ago. Where the road emerges on the north side, the path is so narrow that a projecting mass of rock often precipitates animals into the foaming torrent beneath. The river is here about 150 yards in width, and flows some 500 feet below the mouth of the tunnel.* The Shighnis boast of this place as the natural safeguard of their country, and call it their "father."

From Kuguz Parin the Oxus flows through the country of Shighnán, a State which is tributary to Badakhshán, and which extends for a distance of 60 miles down to the Darband Tower on the frontier of Roshán. This tower is situated on a high rock standing over the river, towards which it presents a perpendicular scarp of about 150 feet. The water beneath is very deep. The roadway winds round the tower,† and the ascent on both sides is very steep and difficult. The Shighnis call this place their "mother." It is a common saying in the country that if ever there should be a quarrel between Shighnán and Roshán, whichever State first seizes this tower will keep possession of both countries. The river is here barely a gunshot across, and there is no path whatever on the other side.

This country of Shighnán would appear to be richer and of much more importance than Wakhán and other districts of Badakhshán with which we are acquainted. From Kuguz Parin to Darband Tower there are numerous villages scattered along both banks of the river. These are surrounded with gardens, orchards, and well cultivated lands. The chief town, Bar Panjah,‡ is on the left bank, and, with its suburbs, probably contains about 1500 houses. The palace is inside the fort, and is built of stone. The fort itself is square, each side being about 500 paces in length. The walls are very strong, and about 40 feet high, built of clay, stone and wood. There are five loopholed towers, but these contain no big guns. There is a garrison of about 400 soldiers, who are mostly armed with swords manufactured in the country itself, and with guns, said to be made by the Kirghiz, viz., heavy rifled weapons which are fired resting on the ground, the muzzle being supported on a prong attached to the barrel of the rifle.

* This portion of the route is not improbably the *Tangi Badascani* of Benedict Goetz.

† At the tower was a guard of soldiers from Wámur, who examine the passports of all travellers.

‡ Or "above Panjah" so named from having been built originally over a stone similar to the one at Kila Panjah, which was supposed to bear the impress of the *Panjah* or *palm* of Hazrat Ali.

Pa-e-Khoja lies on the left bank of the Oxus, below the turn to the west before alluded to, and is said to contain about 1000 houses. It is at a long day's journey below Wámur. This district is inhabited by *Khojaks* who pay no tribute, but give their services as soldiers in time of war. The third district is that of Bartang, which lies up the river of that name, and is said to contain about 500 houses. The direct approach to this district from the Panjah Valley is very difficult, owing to the precipitous defiles through which the river passes; so that the most frequented road between Wámur and Sirich Fort, the chief place of the Bartang district, lies by the somewhat round-about way of the Ghund Valley.

The following additional information was supplied by the Múnshi:—

The country of Shighnán is sometimes called *Zuján* (or two-lived); its climate being so good that its inhabitants are said to be possessors of two lives.

Shighnán is said to have been formerly far more populous and prosperous than at present. Roshán now contains about 3000 houses, and Shighnán about as many more. The two combined could probably muster about 7000 fighting men, armed with swords manufactured in the country itself, and with guns made by the Kirghiz. In an armoury the Múnshi saw some 1500 English smooth-bore guns—many of them with flint locks—probably purchased in former years from the Afgháns. The natives prefer their own rifles to these smooth bores.

Shighnán and Roshán are subject to one ruler—Yusuf Ali Khan, locally designated the Shah-i-Shighnán, who generally resides at Kila Wámur in winter, but spends the summer at Bar Panjah. His ancestors are said to have come from Persia many hundreds of years ago, at a time when Shighnán and the whole of the neighbouring country was under the rule of the Zar-dushtis, or Fire Worshipers—then a very powerful race—many traces of whom still remain in the Oxus Valley, in Ishkashím and Wakhán. The Shah-i-Khamosh, as the leader of the Persian intruders was called, was a Mahometan of the Shiáh faith, and commenced to teach the Koran to the fire worshipping inhabitants of the country, and in about ten years' time his converts became so numerous that he was able to intrigue for the possession of the throne, and commenced a civil war, which ended by his wresting the government from Kahakáh, the then Governor of Shighnán, and founding in his own person the present dynasty. The tomb of Shah-i-Khamosh is at Bar Panjah, where it is an object of religious veneration.

The present King Yusuf Ali is intimately connected by

marriage with many neighbouring potentates—his three sisters were married—one to our ally, the late Amír of Kashghar, another to Khudoyar Khan, the late Ruler of Khokand, while the third was wife of the late Governor of Afghán Turkistan. The women of Shighnán are renowned for their beauty.

As far as our information goes, Shighnán and Roshán have always been tributary to the Mírs of Badakhshán—and since the permanent occupation of that country by the Afgháns—tribute has been paid to the representative of the Amír of Kabul. Formerly the tribute was paid in slaves, but the annual payment now consists of four horses, a small quantity of iron, and a few skins of *ghi*, or clarified butter.

The country is nearly self-supporting, and there is very little trade with any of the surrounding provinces. A certain amount of iron is exported, and foreign luxuries are obtained in exchange. The people appear to be fairly well off, and to live well, drinking very freely of a strong red wine, somewhat like curaçoa, large quantities of which are manufactured in the country from cherries. A fondness for wine is a failing very prevalent among the Shiáh, or unorthodox Mahometans of Central Asia.

At Wámur the Múnshi witnessed a game at Polo, locally termed Changán-bázi. It was played with a soft leather ball, and the rules appeared to be the same as in Ladákh, where it is also a national game.* The King joined in the sport and displayed much skill, and at its conclusion hospitably entertained all the players.

I must now return to our own adventures. Our return route to Yárkand lay up the north branch of the Panjah River, which flows westward from the Victoria Lake through a portion of the Great Pámír.

Captain Biddulph meanwhile returned by the Little Pámír, with the object of visiting, *en route* from Sarhadd, the Baroghil Pass, the lowest known depression of the Hindu Kush. He successfully carried out this duty, and estimates the pass to be only 12,000 feet above sea-level.

I may mention, *en passant*, that Captain Biddulph is now the political officer at Gilgit, and has recently had considerable opportunities of extending our geographical knowledge of those still little known regions near the junction of the Hindu Kush and the Muztagh ranges.

Leaving Panjah on the 26th April (the day previous to which was the first warm day we had since leaving Yangi-Hissar, the thermometer in the shade going up to 74°, and in the sun to

* See 'Ladák, Physical, Statistical, and Historical,' by Alex. Cunningham, 1854, page 311.

99°), we made a short march of only six miles to Langar Kish (9350 feet), the highest inhabited spot on the road up to the lake. We passed on the left the villages of Zang and Hissar, between which is a hot spring (temperature 120°) inclosed in a stone building, and said to possess valuable curative properties, for the sake of which the old Mír occasionally visits the spot. I may note that hot springs are of frequent occurrence in these mountains; some near Patuch in the Sarhadd Valley have a temperature of about 160°. These springs have a sensible influence on the temperature of the rivers they flow into, a fact which tends to neutralize any argument (such as that used by Wood) that the relative elevation of the sources of the two branches of the Oxus, may be estimated from the temperature of the streams at their junction.

Where the two Pámír streams meet opposite Zang, the united river was about 40 yards wide and 1½ deep, with a velocity of 3½ miles per hour. This measurement was taken at 11 A.M., at which period of the day the river had not attained its full size and velocity. In the hot weather, at Panjah, it cannot be forded, but is crossed by rafts made of skins.

Close by the village of Hissar (or Asshor) on a small isolated rocky hill, is the ancient fort (or kila or kalhai) of Zanguebar, which I examined in hopes of finding some relic of Zoroastrian worship. The ruined walls had, within memory, been used as dwelling-houses by the inhabitants of the neighbouring village, but I could discern no relics of antiquity, except fragments of a surrounding wall, and an arch formed by large slabs of stone resting on either side on solid rock.

At Langar Kish, a very picturesque village, a fair-sized stream from the north joined the main stream, passing through one of those characteristic fissures I have before alluded to. I tried to ascend it, but was very soon stopped by enormous boulders lying in the bed of the stream, which flows between perpendicular rocky banks. From this village we had to take all our supplies for the return journey to Sarikól, and as collecting sufficient even for a rapid journey was found to be a matter of considerable difficulty, we had here reluctantly to give up the idea of halting on the road, or making any detour for exploration.

The resources of Wakhán are miserably small, and we had to melt down our tent-pegs, while at Panjah, to get sufficient iron to manufacture horse-shoes for our party.

Our first march from Langar Kish was about 18 miles to Yumkhana (also called Jangalik). The road follows the right bank of the river, rising above it in several places as much as 1000 feet. From both sides occasional small mountain streams

help to swell the waters of the main river. We passed on our right several ruined huts formerly occupied by Kirghiz, who many years ago abandoned this part of the country. The descendants of the men who accompanied Wood on this same journey, driven away by the insecurity of life and property, are now many of them quietly settled, hundreds of miles away, in the neighbourhood of Kilian and Sánjú, under the rule of the Amír of Kashghar. Not a single Kirghiz, I was given to understand, remains even under the nominal sway of the Mír of Wakhán. As we advanced the valley opened somewhat, and the mountains on the south appeared to decrease in height, radiating from a pointed peak situated between the two branches of the Panjah River. After a time we came to the Ab-i-Zer-i-Zamin, a stream flowing from the north-west through banks 1000 feet in height. We had to descend to the bed of the stream, cross and ascend the opposite side, and then traverse a plain, formed by a broad terrace at the foot of the range on our left, and situate about 1000 feet above the bed of the Oxus. Four miles after passing the Zer-i-Zamin River we reached our camp, where some springs and rich soil had combined to produce a profusion of grass and fire-wood. From our tents we had a very fine view down the valley, seeing in particular one very prominent snowy peak, probably 20,000 feet in height, situated near the head of the glacier opposite Panjah. Next day we continued along the right bank of the river, passing, after 5 miles, the Ab-i-Matz, along which is the summer road to Shighnán from the head of Wakhán Valley. This road crosses the Joshingaz, a very high and lofty pass closed by snow throughout the winter and spring, and proceeds down the Shákh-darah Valley) to Kila Rách, the residence of the Hákim of the Shákh-darah district of Shighnán. From Rách a road continues down the stream to Bar Panjah.

On our own road, 2 miles beyond Ab-i-Matz, is Boharak, an occasional halting-place of caravans, stated by our guide to be the commencement of the Great Pámír. Here the valley, hitherto $\frac{1}{2}$ a mile across, widens into a large flat open plain, $1\frac{1}{2}$ mile in width, said to have abounded in former years with the magnificent Pámír sheep (*Ovis poli*). Of these we saw nothing but bones and skulls. Severe murrain has, within the last few years, carried off not only nearly the whole of the wild sheep, but also of the ibex. Six miles beyond Boharak was our camp at Yol Mazar (road-side temple), 2 miles short of which is a large stream joining the river on its left bank, and of equal bulk with it. Near the camp a smaller stream entered on the right bank. I ascended this for some distance, and found an open grassy valley, in which there were some huts in

ruins and some obvious traces of former cultivation; it was doubtless once the residence of Kirghiz. At our camp, which was at an elevation of about 12,300 feet above the sea, there was plenty of fire-wood and grass; this was the highest point in the valley at which good fire-wood was found, although farther up, and throughout this Pámír, there was abundance of "boortsee" and grass. Two inches of snow fell at night, but the morning, though cold, was fine.

We were now fairly in the Great Pámír; the grassy valley, about a mile broad, was bounded by terraces formed by low spurs coming down in gentle slopes from the mountain ranges on both sides. On the 29th April we continued our march along the Pámír to Bilaor Bas. The road was excellent throughout, as in fact it was the whole way from Panjah to Ak-Tásh, although at starting there are numerous steep ascents and descents. The valley gradually widens, but the flat grassy portion is nowhere much more than a mile in width, the ascent was steady, and the road everywhere first-rate. Shortly before reaching camp we passed on our left the Ab-i-Khargoshi which flows from and through the Khargoshi Plain, beyond which, at a day's journey from camp, is the Alichur Pámír, which nominally belongs to Wakhán, but practically to Shighnán. In it lies a small salt lake, Tuz Kul, from which no water flows, and beyond which the drainage goes to Shighnán. Two days' march from this lake, *i.e.*, three days from our camp, the Alichur stream is said to fall into the Murgháb. The Alichur Pámír is reported to be higher but smaller than the Great Pámír, and to possess roads going in every direction.

On the 30th we continued along the Great Pámír for 20 miles to Mazar Tupa, the plain getting gradually wider and wider as we advanced, until a breadth of 6 miles is attained. The valley is not so well defined as that of the Little Pámír, where steep mountains bordered the plain on both sides. Here low spurs from the mountain ranges north and south run into and are hardly to be distinguished from the plain. The mountains on the south are considerably higher than those on the north, the former rise to about 5000 feet, and the latter to about 2500 feet above the river-bed, giving absolute heights of 18,500 and 16,000 feet respectively.

The next day 5 miles of very gentle ascent brought us to the west end of Wood's Victoria Lake, which, like its sister in the Little Pámír, was supposed to have two outlets. Of that to the west there could be no doubt; through a channel some 12 paces wide, a little stream 6 inches deep, with a velocity of $2\frac{1}{2}$ miles an hour, emerged from under the ice with which the lake was covered, and flowed steadily westward. The tem-

perature of the water was 38°, and it was evident that the lake was partially supplied from warm springs. A few wild fowl were congregated near this end of the lake.

The lake runs nearly due east and west, is about 10 miles long, and nowhere more than 2 miles in breadth.

The valley in which it lies is, opposite the lake, about 4 miles broad. The height of the hills to the north I estimated at 3000 feet above the level of the lake, while those on the south were at least 2000 feet higher.

The only name by which the lake is *well-known* to the natives is "Kul-i-Pámír Kalan," *i.e.*, lake of the Great Pámír. I have once or twice heard it called "Airán Kul," or Buttermilk Lake. To avoid confusion, and to make as little possible change in existing nomenclature, I purpose calling it "Kul-i-Pámír Kalan," or "Victoria Lake," the last name being the one originally bestowed by its discoverer, Lieutenant Wood. Our camp, which was about 2 miles east of its head was called by the Wakhis "Sar-i-kul" (head of the lake), a camp in a corresponding position at the lower end being called "Bun-i-kul" (foot of the lake). This may account for the other name erroneously given to it by Lieutenant Wood (Sir-i-kól).

After reaching camp, a distance of 16½ miles, I went to the head of the lake to investigate its drainage and determine its limits (for from a little distance off it was impossible to discriminate between the ice and snow on the lake, and the snow on shore). I was soon convinced that all the water from the hills at the east end drained *into* the lake, which therefore like its neighbour in the Little Pámír has but one outlet, although in the former case the water flows west, and in the latter east. To the east of the lake the valley opens out, and forms a large basin which extends ten or twelve miles from west to east, and six miles from north to south. At the lower portion of this basin, surrounding the head of the lake, is a great deal of marshy ground formed by the drainage which enters from numerous side valleys from the hills on the south. At the time of our visit this marsh was covered with snow and ice; but later on in the season, when the snow is melting on the surrounding hills, there is much water, and the place is said to become the favoured breeding place of thousands of geese.

Our march from Sarikul lay along the northern side of the valley, the whole of which was deep in snow, and was so level that I experienced considerable difficulty in determining the correct position of the watershed, which was crossed at a distance of 21 miles from the east end of the lake and at a height of 14,320 feet. A frozen stream here comes down from the north,

divided into two portions by a low ridge of gravel, one flowing eastward into the Ak-sú River, the other westward into the lake.

Eastward from the watershed the Great Pámír Valley contracts. We followed down a rivulet which, shortly before reaching the camp at Shásh Tupa, joins a considerable stream coming down a broad valley from the south. The name of our camp was derived from the "Shásh Tupa" or "six hills" by which it is surrounded, and between each pair of which roads issue to different parts of the Pámír steppes.

Our road from Shásh Tupa lay for nearly 8 miles due north on the right bank of the stream, and then continued down it for 10 miles in a north-east direction to the camp "Dahn-i-Isligh." On our left we passed three broad open ravines, containing streams coming from the west; one of them was nearly as large as the river we were following, and before joining it passed through a plain some 6 miles long and two broad. At Dahn-i-Isligh the river is joined by two more streams, the Kizil Robot coming from the south-east, and the Kara-sú from the west, both of which pass through broad grassy valleys. The ground is very open, and may be traversed in almost every direction. Two or three miles north-east of our camp the Great Pámír terminates, having extended for a distance of some 90 miles from Boharak.

From Dahn-i-Isligh I took a path which follows the Isligh stream, until it emerges into the Ak-sú Plain; this road is somewhat circuitous, and the rest of the party took a shorter line, going over a low pass, and rejoined the main stream about 16 miles from our starting point. The path I followed is rarely used by travellers; in summer it is quite impassable on account of floods. When I went down it (in April) the ice was breaking up, and travelling was somewhat dangerous, as the river had to be crossed many times. The hills on the north are very precipitous, and in places rise nearly perpendicularly to a height of some 2000 feet above the river-bed. Where the two paths unite, the valley opens, and down it a good road leads to the Ak-sú Plain, which is crossed diagonally in a south-east direction. Prior to reaching our camp at Ak-Tásh, we had much difficulty in crossing the Ak-sú River, which was much swollen by melting snow. On this march (37 miles in length) I had the good fortune to shoot an *Ovis poli*, the only one that has fallen to the rifles of our party.

At Ak-Tásh we rejoined the road we had followed on our outward journey, and returned by it, to Tashkurghán and Yárkand making the slight variations in our route, to which I have already alluded.

It appears from the foregoing narrative that although the name Pámír has been inaccurately employed as a generic term covering the whole of the elevated mass lying between the Hindu Kush and the mountains of Khokand, yet it is rightly applied to some of the *steppes* which occupy a large portion of this region. These steppes would appear to be a series of broad undulating grassy valleys, formed on the surface of an elevated plain, by lofty ridges running more or less parallel to the equator. The general slope of the plateau is from east to west. Its eastern portion is gently undulating, and comparatively flat, while its western edge merges into spurs, separated by bold and precipitous defiles. On the east the Pámír steppes are bounded by a transverse ridge, which has been termed the Pámír Range. This ridge runs in a northerly direction and is the true water parting between eastern and western Turkistan; at the Neza Tash Pass where we crossed it at a height of 14,915 feet, the watershed is very clearly defined, and the ridge rises some 2000 feet above the valley of the Ak-sú River which flows at its base. This watershed was again crossed by the Russian Scientific Expedition under Kostenko in 1876, at the Uz Bel Pass—15,200 feet above sea-level—also about 2000 feet above the valley of the Uz Bel and the Chon-sú Rivers.

To the east of the Pámír Range there is an extensive plateau which stretches from the Muztágh Range of the Himalaya Mountains, up to—as far as I myself saw—lat. 38°20', but said by Kirghiz to extend up to the neighbourhood of the Kizyl-Yart Pass. This plateau is in turn bounded on the east by the range which Hayward designated the Kizyl-Yart, the name by which it is known to the inhabitants of Kashghar.

Mayef's description of the Uz Bel-sú shows that the Pámír Plateau, where he visited it, has much the same characteristics as where we ourselves did. He says that the rivulet runs a course of about 20 miles without any deviation from its original direction. In its lower course it is much confined by mountains of no great height, farther on, however, the valley opens out to widths of 2 or 3 versts, with a flat smooth surface gradually ascending eastwards. The mountain chains to right and left rise to 2000 and 3000 feet above the valley, those, however, skirting the valley on the left or south side are somewhat more elevated, attaining to 15,000 and 16,000 feet, and so rising above the snow-line. The declivities are bare and sterile, as is also the surface of the Uz Bel-sú Valley.

It is instructive to turn from this to Fedchenko's description of the Alai Valley,* which he describes as a "tract limited by

* Manuscript translation by Colonel Yule, c.n.

parallel mountain ranges, which rise gradually from 8000 to 12,000 feet in height, and widens gradually as it rises. Towards its lower end it is separated from the crests of the limiting ranges by outlying mountains, but towards its upper end it spreads towards these crests without any passable break in the surface. At the western termination of the steppe it becomes gradually narrower, hemmed in by other ranges which rise parallel to the principal chain and ends in a defile which affords room for the exit of the river and no more."

After a perusal of the description of the Alai by M. Fedchenko and of the northern portion of the Pámír Plateau visited by Kostenko, no doubt is left on my mind, but that the whole of the so called Pámír Plateau, including in this term the whole country between the Little Pámír on the south, and the Alai Plateau on the north—and bounded on the east by the Pámír ridge, may be regarded as having a common physical configuration, resembling in many important respects the system of the Tian Shán. This is in part what Fedchenko always contended for, but he went much farther and maintained that the whole mass of the mountain system which separates the Oxus and Tarim basins, was similarly divided into parallel mountain ranges running from east and west. He could not be brought to agree with Hayward, who was the first to resuscitate Humboldt's idea of a great meridional chain connecting the systems of the Himalaya and the Tian Shán.

Fedchenko argued that the line of snowy mountains seen by Hayward from the plains of Kashghar, really were the culminating ends of a series of parallel mountain ranges running east and west.

There can, however, I think, from what I have already stated, be no possible doubt that such a meridional chain does exist. I was myself enabled from various points on the road from Yárkand to Kashghar to fix with considerable accuracy the position of several peaks of this Kizyl-Yart Range; the four most conspicuous ones, embracing a length of 52 miles, I found to lie almost exactly in one straight line, having a direction of about 30° west of the true meridian. The most southerly and the highest of these, the Tagharma Peak of Hayward, I ascertained trigonometrically to be 25,350 feet above sea-level, while two others are at least 22,500 feet high.

Now this same Tagharma Peak has also been seen by M. Fedchenko from the Is'fairam Pass, and he rightly estimated its height at about 25,000 feet, which is three or four thousand feet in excess of the estimate made by Hayward. From Fedchenko's point of view the peak to which he gave the name of Mount Kauffmann, appeared to be a continuation of the

Trans-Alai Range, but the recent visit of Major Kostenko has put this question beyond all doubt. He saw these mountains from the west from the Uz Bel Pass 15,200 feet above sea-level. From this point, looking east over the valley formed by one of the sources of the Kashghar River, he says, "the valley a long way ahead seems bound by a grand mountain range rising considerably above the snow-limits and whose peaks appear to rise to a height of about 25,000 or 26,000 feet.

It will be recollected that on our journey to the Little Pámír, while travelling in a direction nearly at right angles to this chain, we crossed several spurs at heights varying from 13,000 to 15,000 feet, and separated by deep valleys, lying 3000 or 4000 feet below the crests of the passes. The streams down these valleys all flowed in a south-easterly direction towards the Yárkand River, in which direction the Kizyl-Yart Range diminishes very much in height. The Tashkurghán River pierces these same mountains, passing through a deep and precipitous gorge at a height of about 10,000 feet above sea-level. Little is known of the range farther south, but it would seem to be a connecting link with the Himalayan Ranges, so that the old Chinese geographers who did indeed link together the "Bolor" and the "Mustágh or Kárákorum" under the common name of "Tsung Ling," or "onion mountains," were not far wrong in their ideas.

To show the extent to which theorists may carry their views, and the inconvenient consequences that may sometimes arise therefrom, I may mention that one day at Yangi-Hissar we received a budget of three weeks' English letters and newspapers. On opening the last file of the 'Times' I was astonished to find a letter from the Berlin Correspondent of that journal stating that he had recently studied the latest Russian map by Fedchenko, from which it appeared that the range which I have been describing did not exist. From this he proceeded to argue that a railway might, without the slightest difficulty, be constructed from the Oxus basin to that of the Tarim, in the approximate latitude 39°. I glanced up from my paper as I read, and in the exact spot indicated I saw these vast inaccessible, apparently unbroken mountain-masses covered with perpetual snow, and rising to a height of more than 20,000 feet. I should recommend intending subscribers to the proposed railway to wait for further detailed surveys before they commence operations; but, up to the present time, these vast mountain masses have still proved inaccessible to all attempts at exploration.

It has been the fashion in England to assume that the Russians have for a long time been better acquainted with this

portion of Central Asia than we are; but this is a great mistake. Up till very recently they were as ignorant of the country as we ourselves; their maps showed the same extent of blank and *terrá incognitá*, and although we have hitherto been generally dependent on them for maps of the countries within and in the vicinity of their frontier-line, they have been equally dependent on us for all maps of countries in the neighbourhood of our own frontier, as well as of the head-waters of the Panjah branch of the Oxus. During the last few years, however, the Russian explorers have made such rapid strides, that the belt of *terrá incognitá* between their advanced surveys and our own has, I am happy to say, in the interests of geographical science, been very considerably reduced. I have already indicated the advanced lines followed by our British explorers, and I will now briefly indicate the most recent approaches of Russian geographers. In 1872 a Russian mission under Baron von Kaulbars came to Kashghar *viá* the Lake Chatyr Kul, and when in the following year I myself made a route-survey from Kashghar to Chatyr Kul, I forged the first link in the chain of surveys common to both countries. I must, however, in all fairness, assign to the late Mr. Hayward the honour of having been the first on either side to take astronomical observations at Kashghar. It was a great source of gratification to me when I returned to India and worked out the final results of my astronomical work at Kashghar to find that my resulting position, both in latitude and longitude, practically coincided with that obtained by Colonel Scharnhorst, the astronomer of the Russian Expedition, while our joint positions of Lake Chatyr Kul accorded equally well. The heartbreaking discrepancies which had hitherto existed in the assumed position of Kashghar were thus finally put an end to, for which I confess I think geographers and map-makers ought to be thankful.*

An almost equal source of gratification on my return to India—after all my computations were completed, and the details of routes transferred for the first time on to a correct graticule—was to find that my position of the west end of Victoria Lake (which was the extreme east point reached by the late Lieutenant Wood in his journey to the source of the Oxus in 1839), is practically identical with the independent determination of the same point by that distinguished traveller.

The second link in the chain of surveys common to the Russians and ourselves is the line from Kuláb to Kurghán Tapa and Kubábian, which was traversed and roughly sur-

* For further details see Appendix at the end of this paper, which is extracted from my Report, originally submitted to the Government of India in 1875.

veyed in 1874 by the *Havildar*, one of the Indian Survey employés. He was the first to identify the *Vaksh* with the *Surkháb*, or river of *Kárátégín*, and to determine approximately the whereabouts of its junction with the *Oxus*. A Russian scientific expedition under Major *Mayef* surveyed the same route, with more care and precision in the following year, and, curiously enough, although its members were most anxious to fix rigorously the junction of the *Vaksh* with the *Oxus*, circumstances prevented them from accomplishing their desire. They, however, made most valuable explorations and surveys to the north-west of the line *Kuláb-Kubédian*, filling up what was previously a large blank on both English and Russian maps, while the *Havildar*, on the other hand, has given us new and valuable information about the course of the *Oxus* to the east of *Kuláb*, and of the country of *Darwáz* through which it flows. Shortly before our visit to Kashghar the Russian traveller and savant, *Fedchenko*, did some very valuable pioneering work in *Khokand* and the *Alai*, and he was the first to visit the head-waters of the *Kizyl-su*. He was a most keen, enthusiastic and accomplished geographer, whose untimely and sudden end in Switzerland a few years ago was a very heavy loss to geographers. It is only a few days since I was reading some remarks by him on his mortification at being prevented from penetrating to the south of the *Alai*. Alluding to the 160 miles that then separated his own discoveries in the *Alai* from the English explorations from the south, he says, "This is as yet the *real neutral zone* (the name is suggested by the fictitious neutral zone lately concocted by diplomacy), on which neither Russian nor English foot has yet trodden, though the high scientific interest which attaches to the region makes its exploration the ambition of both nations—eminently so of the English, whose geographical emissary, *Hayward*, paid with his life his persevering efforts to penetrate the mysterious *Pámír*"—he continues, "My heart's desire, also my ardent hope, the vision ever before my eyes since I first set out for *Turkistan* in 1868—was to reach *Pámír*; but the hoped-for result was not attained."

I have already alluded to the work done in the *Pámír* district on the occasion of General *Skobeleff's* advance with a military force into the *Alai* in 1876, an account of which has been given to the Society by Mr. *Michell*.* The exploring party under Captain *Kostenko* reached and surveyed the *Lake Kára Kul*, and advanced as far as the *Uz Bel Pass*. Another Russian exploration party, consisting of Messrs. *Severtzof*, *Skami*, and *Schwarz*,

* See 'Journal' B.G.S., vol. xlvii., 1877, page 17.

visited the same district in September 1877; but, as far as I can learn, they did not succeed in penetrating farther south than Kostenko had done, but were prevented by deep snow and the running short of fuel and provisions from continuing their advance.

Another Russian officer, Captain Kurapatkin, in the autumn of 1876, travelled from Osh to Kashghar by the Terek Pass, and thence onwards by Marálbashi to Aksú, thence on to Kurla and Káráshahr. No account of his journey has, as far as I know, yet reached this country.

I cannot close this paper without an allusion to the recent wonderful success of Colonel Prjevalski farther east, a success which, I may say in the words of Fedchenko, "it was once my own heart's desire and ardent hope to attain." Starting from Kuldja, he reached early last year the celebrated and almost mythical Lake Lob, in the centre of the hitherto unexplored desert of Gobi. This lake is the sole final receptacle of the drainage of the mountain masses which inclose Eastern Turkistan on north, west, and south. He went 120 miles farther south, to the northern edge of the great Tibetan Plateau, where he saw and hunted the wild camel. This enterprising traveller is now engaged in an attempt to visit Lhása *via* Guchen and Hami.

There still remains, as we have shown, a broad belt of *terra incognita* on the Pámír Plateau. It will, we hope, ere long have its geography cleared up, although the laurels must necessarily fall to the Russian geographers; for their occupation of the country of Khokand, which has for a long time exercised some control over the nomadic Kirghiz tribes of the Alai, gives them opportunities and motives for farther exploration which we do not possess, and now that our recent ally, the late Amír of Kashghar, is dead, and his kingdom once more in possession of its former masters, the Chinese, who never in former years exercised more than nominal sovereignty over these interesting regions, I fear there will be little opportunity for farther explorations from the British side. In scientific questions there ought to be no politics, and I for one shall be glad to learn that the Russians have extended their surveys as far south as the line by which our party crossed the Pámírs in 1874.

APPENDIX.

*On the construction of the Map.**

The positions of all places in Eastern Turkistan and Wakhán, that were visited by members of the Mission, depend upon the astronomically fixed positions of the Yangi-Shahr, or new city of Kashghar.

The final positions in longitude of Yárkand and other important places have been determined as follows:—

The true longitude of KASH- GHAR (Yangi-Shahr is) .. ..	.. ..	76° 6' 47"
The difference of longitude between Kashghar and Yangi-Hissar as determined by Pundit Kiahen Sing's pacing, corrected from lati- tude observations, is—		
On outward journey	+ 0° 6' 15"	} mean 6' 8" + 6' 8"
On return journey	+ 0° 6' 0"	
Giving for longitude of Yangi-Hissar .. ..	.. ..	<u>76° 12' 55"</u>

The difference of longitude
between Yangi-Hissar and
Yárkand, determined in
the same manner—

By outward journey is ..	1° 3' 0"
By return journey	1° 4' 25"

On the outward journey the
survey was carried along
the direct road, about 75
miles in length, and over
a perfectly level country,
whereas on the return
journey the road followed a
circuitous line of 180 miles,
over one snowy pass and
very rough ground. The
first value is therefore
accepted in preference, viz.

Giving a final value for YÁRKAND (Yangi-Shahr) of	.. ..	<u>1° 3' 0"</u>
	.. ..	<u>77° 15' 55"</u>

which is 0° 3' 5" in defect of the astronomically determined value of the same place. I have determined to accept the value as deduced from Kashghar in preference to the independent results arrived at from observations to the moon.

Again, the final longitude of
Yangi-Hissar (as above) is

The difference between Yangi- Hissar and Tashkurghan by Pundit's pacing cor- rected for latitude is .. ..	.. ..	76° 12' 55"
The difference ascertained chronometrically by Cap- tain Trotter is	53' 25" }	mean 53' 54"
Giving a final value for TASHKURGHAN of	54' 28" }	
	.. ..	<u>75° 19' 1"</u>

* This Memorandum is extracted entire from the Report submitted by me to the Government of India in 1875.—H. T.

which is 4' 59" in defect of the value obtained from one night's observations to the moon at the same place.

The longitude of Kila Panjah (Wakhán) was determined chronometrically:—

1. On outward journey, from Tashkurghán	72° 44' 18"
2. On return journey, from Ighiz-yar (near to and connected with Yangi-Hissar by a traverse survey)	72° 46' 40"
Giving a final longitude for KILA PANJAH of	72° 45' 29"
Whilst the observations for absolute longitude at the same place give a result of	72° 45' 30"
And a fourth entirely independent result obtained by Captain Trotter's route survey, corrected for latitude is	72° 44' 10"

The mean result obtained chronometrically is adopted for the final position. The wonderfully accurate results at Kila Panjah, although highly satisfactory, must perhaps, to a certain extent, be regarded as fortuitous; but the admirable rates obtained for the watch employed in the chronometric determinations, a silver *lever watch*, by Brock of London, specially made for explorations, are worth recording,* and ought to give results in the accuracy of which great confidence may be placed.

* TRAVELLING RATES obtained by CAPTAIN TROTTER for BROCK'S LEVER WATCH No. 1602, during JOURNEY from YANGI-HISSAR to KILA PANJAH, and RETURN JOURNEY to YÁBKAND.

STAGE.	DATE.	Number of Days from which Rate was determined.	Rate per Diem gaining in Seconds of Time.	REMARKS.
Yangi-Hissar to Aktala.	18th to 22nd March.	4	+ 6.0	(1) Rate obtained by comparing difference of observed times with difference of longitude as derived from Pundit's pacing, corrected for latitude.
Ak-tala to Tashkurghán.	22nd to 31st March.	9	+ 6.1	(2) Ditto ditto.
Yangi-Hissar to Wakhán and back to Ighiz-yar.	18th March to 18th May.	61	+ 6.1	During these 61 days almost an entire circuit was made. The difference of longitude between Yangi-Hissar and Ighiz-yar, viz., 1' 45" only, was determined by Pundit's pacing.
Kogachak to Ak Tash.	3rd April to 6th May.	32	+ 5.7	During these 31 days a smaller circuit was made; the difference of longitude between Kogachak and Ak Tash is 1' 36". In both these circuits allowance has been made for the stationary rate (+ 7".8) obtained during our halt in Wakhán.
Kashghar to Ighiz-yar.	15th to 18th May.	3	+ 5.5	Rate obtained in same manner as (1) and (2).

It should be noted that my watches and chronometers were always carried in a small box that I had specially made for them, carefully packed in cotton wool, and inserted in the middle of a large leather mule trunk, packed with clothes. They were thus kept at a tolerably uniform temperature and escaped in great measure the jerks and shakes they would otherwise have been exposed to. Of my pocket *chronometers*, having a regular chronometric escapement, one by Peter Birchall, London, No. 1096, was well suited for astronomical observations, keeping excellent time when stationary and beating half seconds very audibly. It was

I am much gratified to be able to state that after all my computations were completed, and the details of routes transferred for the first time on to a correct graticule, my position of the west end of Victoria Lake (the extreme east point visited by Wood in his travels) was latitude $37^{\circ} 27'$ north, and longitude* $73^{\circ} 40' 38''$, which is practically identical with the independent determination of the same point by Lieutenant Wood, which is given at page 232, new edition of Wood's 'Oxus,' with essay by Colonel Yule; London, 1872.

I will now indicate how the positions of points on the road between Leh (Ladakh) and Yarkand have been determined. The position of Ak-tagh (2nd camp) was fixed by myself in lat. $36^{\circ} 0' 11''$ and long. $78^{\circ} 6' 20''$. It was the converging point of three different route surveys (by Pundits) starting from fixed points on the south, and is in the neighbourhood of a hill above Chibra, whose position was satisfactorily fixed by intersection (on the plane-table) of several rays from trigonometrically fixed peaks of the Kárákorum. The position of Ak-tagh in longitude with regard to these peaks may be looked on as correct within a mile, and its position in latitude is undoubtedly correct within a few hundred feet.

From this point three traverse lines have been carried by different surveyors to Karghálík, which, when corrected and adjusted on the proper parallel ($37^{\circ} 53' 15''$), had a maximum divergence of $3\frac{1}{4}$ miles, the mean of the three values gives a position in (true) † longitude of $77^{\circ} 25' 30''$.

Between Karghálík and Yarkand I had also two independent traverses, *s. e.*, on both outward and return journey, which differed from each other in the resulting longitude of Karghálík by less than a mile. The mean of these two when referred to the value of Yarkand as determined from Kashghar places Karghálík in longitude $77^{\circ} 28' 30''$. A mean between this and the value previously deduced from the south gives $77^{\circ} 27' 0''$ which has been assigned as its final position. The smallness of the amount of the adjustment necessary to connect my own work, depending on my own astronomical observations at Kashghar, and that depending on the Indian Survey derived from the astronomically fixed position of Madras, is a gratifying proof of the general accuracy of the work.

This sketch would be incomplete without a few lines as to my connection on the north with the Russian Survey, which appears, I think, equally satisfactory with the above.

The only position in the Amír of Kashghar's dominions in Eastern Turkistan astronomically fixed by the Russians is that of Kashghar. This was done in 1872, the year prior to our own visit, by Colonel Scharnhorst of the

always used by me in my astronomical observations, but it required very careful handling, as a violent jerk was apt to make it gain several seconds suddenly. A third watch, a pocket chronometer, by Dent, unfortunately got out of order before the Pámír trip, but I had found that, while travelling, neither its rate nor that of Birchall compared favourably with that obtained from Brock's watch. It is perhaps needless to add that my watches were daily carefully compared together, and also both before and after observations of stars. An omission to do this on a single occasion prevented my getting a chronometric value for the differences of longitude between Yangi-Hissar and Kashghar.

* The position in longitude in the "Preliminary map" differs slightly from this, as the latter had to be prepared prior to the completion of the computations.

† True, *s. e.*, depending on the most recent determination of the longitude of Madras. All the Indian Survey maps are based on the astronomically determined position of the Madras Observatory. Recent observations have shown that the old value, that is the one adopted by the Survey Department, is about 3 miles too much to the east. In my map I have been compelled to make allowance for this, and have shifted 3 miles to the west the whole of the positions in Northern India taken from the existing maps.

Mission under General Baron Von Kaulbars. A comparison of results is given :—

Position of Yangi-Shahr (Kashghar) determined by English Mission, 1873 :—

Latitude 39° 24' 26" North.
Longitude 76° 6' 47" East of Greenwich.

Position of Yangi-Shahr (Kashghar) determined by Russian Mission, 1872 :—

Latitude 39° 24' 16" North.
Longitude 76° 4' 42" East of Greenwich.

As the quarters occupied by the British Mission, where the observations were made, lies outside and to the east of the fort, while those occupied by the Russians were in about the same latitude and nearly 1 mile to the west of the fort, the difference in longitude is reduced to about 1 mile, our latitudes being practically identical. I would have wished to take the mean between the two as the final position of Kashghar, but as our stay there was of much longer duration than that of the Russians, and I had opportunities of taking many more observations than they did, I prefer leaving my own values intact.* The slight discrepancy now noticed disappears on the road between Kashghar and Chatyr Kul, the only line of survey common both to the Russians and ourselves, and along which I carried a rough traverse survey in which the distances were estimated by the time occupied on the line of march. Prior to my departure from India, Colonel Stubendorff, of the Russian War Office, had sent to Colonel Walker, the Superintendent of the Great Trigonometrical Survey, the positions of a number of points in Russian and in Khokandian territory that had been astronomically determined by Russian officers. Amongst them was the north-east corner of Lake Chatyr Kul. Bearing this in mind, when at the most northerly point on the road reached by us, I took a bearing tangential to the east end of the lake, which lay nearly due north at a distance of about 3 miles from us. On my return to India, when I plotted in my work from my own astronomical position of Kashghar, I found that by adopting the Russian value in latitude of the east end of the lake, viz., latitude 40° 43' north, our positions in longitude † of the same point exactly coincided.

In determining the position of Khotan I have made use of Pundit Kishen Sing's route from Karghálík to Khotan, and thence *viâ* Kiria back to Ladákh. As a result of this route survey, our previously accepted value of the longitude of Khotan has been altered by more than 30 miles. It may appear bold to make this extensive change in the position of a place that has been visited by a European explorer (Mr. Johnson), but the route survey executed by this Pundit is so consistent, and the plotted results agree so closely with the observed latitudes throughout the whole of his work, that I have no hesitation in accepting it as correct. I may further add that I have been in communication with Mr. Johnson on the subject, and that he freely admits the possibility of a large error in his longitude of Khotan.

* Since the above was written Colonel Walker has heard from Colonel Stubendorff that the Russian astronomical observations at Kashghar which were taken by Colonel Scharnhorst were referred to the most northern angle of the Yangi-Shahr, a position almost identical in latitude with my own, and differing by two-fifths of a mile only in longitude. Colonel Stubendorff mentions that the Russian observations depend on the eclipse of the sun on the 6th June, 1872, and that corrections for error in the lunar tables have not been applied. This last remark applies to my own observations also.—H. T.

† 75° 24' East of Greenwich.

He states that in commencing his reconnaissance from the Kuen Luen Mountains (which he carried on with the plane-table only), one of the three trigonometrically fixed points on which his work was based, turned out subsequently to have been incorrectly projected on his board. This, together with the doubt that must always exist when rapidly passing through an unknown country as to the identity of the different peaks visible from the line of march, is quite sufficient to account for the discrepancy. In my preliminary map I have assigned to Khotan a longitude of $79^{\circ} 59'$ instead of $79^{\circ} 28'$, the position it has recently occupied on our maps. About its latitude there can be no doubt. Mr. Johnson took several observations there with a 14-inch theodolite and obtained a mean result of $37^{\circ} 7' 35''$, whilst from Kishen Sing's observations with a sextant, extending over nearly a month, we have a mean result of $37^{\circ} 7' 36''$. The points east of Khotan, i.e. Kiria and the Sorghak gold-fields, are derived from Kishen Sing's route survey, combined with his latitude observations. We also have from the same source a complete survey for the first time of the road *vis à* Polu to Noh, and thence to Leh. As a specimen of the accuracy of this Pundit's work, I may mention that when the road from Karghálík to Pal, a distance of 630 miles, was plotted out on the scale of 2000 paces to the mile, without any correction or adjustment whatever (although $4\frac{1}{2}^{\circ}$ were added to each magnetic bearing in order to allow for magnetic variation) starting from my own value of Karghálík, the plot closed at Pal (fixed by the Great Trigonometrical Survey) almost absolutely correct in latitude and only eight minutes out in longitude, and in no single portion of the whole route, which passes over elevations exceeding 17,000 feet in height, did the plotted value differ by as much as 3 miles from his own observed astronomical latitude.* Of this discrepancy of eight minutes in longitude it is possible that a portion may be due to error of position in the starting-point (Karghálík), but it may be noted that the amount is no more than would be accounted for by an error of $1\frac{1}{2}^{\circ}$ in the assumed value of magnetic variation. It is not to be supposed that such accuracy is generally attainable, but in the present case, although the surveyor laboured under certain disadvantages from the absence of inhabitants, yet there were the compensating advantages that he was under no necessity for concealment; he was therefore able to take and record bearings when and where he pleased.

As regards the work executed to the north-east and east of Kashghar; the position of Marálbashi, on the road to Ak-sú, was fixed in latitude by Captain Biddulph, and its position in longitude is roughly determined by a few bearings, and estimated distances taken by him on the road from Kashghar.

On the road to Ush Túrfán I carried on a rough route survey wherever I went, and took observations for latitude and obtained chronometric determinations of longitude as far as Uí Bulák, in latitude $40^{\circ} 26'$ north, and longitude $77^{\circ} 36'$ east. Thence by route survey I got a determination of the position of the Belowiti Pass; calculating from this the probable position of Ush Túrfán, I place it about three-quarters of a degree to the east of the position given it in the early edition of Colonel Walker's Turkistan map. On examining the latest Russian map, it appears that the position of Ush Túrfán has been recently altered, and placed very near where I would myself locate it. I have therefore in my map adopted the last Russian values of Ush Túrfán, Ak-sú, and all places to the east. It will be found that the cities of Ak-sú and Kuldja are more than 40 miles to the east of the places assigned them in all but the most recent maps.

The details inserted to the north of the map are taken almost exclusively from the Russian topographical map of Central Asia (corrected to 1877).

Most of the details to the south of the map, with the exception of those

* See Geographical Appendix, Section A, of Captain Trotter's Report.

portions north of Leh that have been traversed by members of the Mission, have been taken from the last edition of Colonel Walker's Map of Turkistan, but all the positions in the latter have been shifted three minutes to the west in longitude in order to allow for the most recently determined value of the longitude of Madras, viz. $80^{\circ} 14' 19.5''$ east of Greenwich.

In the portion of country traversed by Members and Attachés of the Mission, use has been made of all the material collected by them. The maps of Messrs. Shaw and Hayward have also been called into requisition.

The reductions of the astronomical observations, and the computations of heights, have all been made in the Office of Colonel Walker, R.E., the Superintendent of the Great Trigonometrical Survey, in whose office also the map compiled by myself has been drawn and photozincographed. A large amount of work has been got through in a moderate space of time, and I am deeply indebted to Colonel Walker for the facilities he has given, and to Messrs. Hennessey, Keelan, and Wood, in the Computing Office, and Messrs. Atkinson and Sinden in the Drawing Office, for the assistance afforded by them in their several departments.

H. TROTTER, Capt. R.E.

VI.—*Haiti*, or *Hispaniola*. By Major R. STUART,
H.M. Minister, Haiti.

LITTLE is commonly known of an island which, from its size, natural wealth, and position, was, not far back in modern times, the theme of widespread speculation, which was marked out to be the metropolis of a prospective empire, but is now in a state of poverty and decay, in painful contrast with the grandeur of its early destinies.

The island I allude to is known by the names of *Haiti* and *Hispaniola*, and also, but with insufficient warrant, by that of *Santo Domingo*. The object of this paper is to give some account of it, and recall attention to its forgotten importance, seeing that one day the force of progress and the march of events must restore to it a prominent place in commerce and in political consideration.

When speaking of the island as a whole, I shall call it by the name of *Haiti*.

Looking in any good atlas to the map of the West Indies and Central America, one will find this island lying between the 18th and 20th parallels of N. latitude, and between $68^{\circ} 20'$ and $74^{\circ} 26'$ w. longitude from the meridian of Greenwich. Its extreme length from Cape Engano on the east, to Cape Irois on the west, is 356 nautical miles;* its greatest breadth is 140 miles, from Cape Beata, in latitude $17^{\circ} 53'$ in the south, to the highest point on the north coast, which is $19^{\circ} 58'$. The coast

* Throughout this Paper the miles given are nautical miles.