PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

VOL. XVI.

SESSION 1871-72.

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Authors are alone responsible for the contents of their respective statements.

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CONTENTS OF VOL. XVI.

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No. I.

	Page
HINTS TO TRAVELLERS	1-78

No. II.

RAWLINSON, SIR H. C.—Opening Address of	81
ELTON, CAPT. F.—Exploration of the Limpopo River	89
BURTON, CAPTAIN R. F.—Exploration of the Tulúl el Safá, &c.	104
VON MALTZAN, BARON—Geography of Southern Arabia	115
JOHNSTON, MR. KEITH—Notes on Wakefield's Map of Eastern Africa	125
BURTON, CAPT. R. F.—Ukara or Ukerewe Lake, Equatorial Africa	129
LIVINGSTONE, DR., POSITION OF—Letters from Dr. Kirk	102
Proposed Search Expedition	124
PRINCE OF WALES, Illness of the	124

ADDITIONAL NOTICES.

OMMANNEY, VICE-ADM.—International Geographical Congress at Antwerp ..	132
WALKER, CAPT. J. B.—Old Calabar and Cross Rivers	135
MANN, DR. R. J.—Sand Bars at Mouths of South African Rivers	138
ROSS, MAJOR E. C.—Journey through Mekran	139

No. III.

MILES, CAPT. S. B.—The Somali Country	149
MARKHAM, MR. C. R.—Livingstone Search and Relief Expedition	158
NEW, REV. C. / BUSHELL, REV. R. } Ascent of Mount Kilima Njaro	167

Page

DE CRESPIGNY, LIEUT. C.—Northern Borneo 171
BLAKISTON, CAPT. T.—Journey round the Island of Yezo 188
MORGAN, MR. E. D.—Palladius' Journey through Manchuria 204
ROSS, MAJOR C. C.—Journey through Mekran 219
LOVETT, MAJOR B.—Survey of the Perso-Kelat Frontier 219
PALGRAVE, MR. W. G.—Tour in North-Eastern Anatolia 223
OSBORN, CAPT. S.—Exploration of the North Polar Basin 227
SHAW, MR. R. B.—Position of Peïn, Charchand, Lob Nur, &c. 242
MONTGOMERIE, MAJOR T. G.—A Havildar's Journey through Chitral to Faizabad 253
LOVETT, MAJOR B.—Route from Shiraz to Bam 261

LIVINGSTONE SEARCH AND RELIEF EXPEDITION .. 145, 158, 184, 203, 225, 241
BAKER, SIR S.—Upper Nile Expedition 187

ADDITIONAL NOTICES.

HUGHES, MR. T. F.—Visit to the Chief Tok-e-Tok, Southern Formosa 265
ROCHELLE, MR. I. H.—Geographical Positions in the Valley of the Amazon .. 271

No. IV.

ANNIVERSARY MEETING.—PRESENTATION OF ROYAL AND OTHER AWARDS 278–290
ADDRESS BY SIR H. C. RAWLINSON 291–377

No. V.

MARKHAM, LIEUT. A. H.—The New Hebrides and Santa Cruz Groups, South-West Pacific 388
SHAW, MR. R. B.—Central Asia in 1872 395

LIVINGSTONE, DR.—News of his Safety 379
Later intelligence of 410

ADDITIONAL NOTICES.

LIVINGSTONE, DR.—Documents relating to the Search and Relief Expedition .. 412
STRACHEY, GEN. R.—On the Scope of Scientific Geography 443
HALE, REV. E.—The Place of Geography in Education 450

INDEX 455

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19

HINTS TO TRAVELLERS.

EDITED BY A

COMMITTEE OF COUNCIL OF THE ROYAL GEOGRAPHICAL SOCIETY,

CONSISTING OF

ADMIRAL SIR G. BACK, F.R.S.,

VICE-ADMIRAL RICHARD COLLINSON, C.B.,

AND

FRANCIS GALTON, ESQ., F.R.S.

Third and Revised Edition, December, 1871.

[*Forming No. I. Volume XVI. of the* 'PROCEEDINGS.']

CONTENTS.

PAGE

Introduction 5

Outfit, 7.—Books, 10.—Additional Instruments, not necessary, but convenient, 11.—Extract from a letter from J. KIRK 12

Sextant Observations, 12.—For Latitude, 13.—For Longitude, 14.—Notes on Observing with a Sextant, by F. GALTON, 16.—Knorre's method of bringing the image of a star in the Sextant into contact with the reflexion of the star in the Mercurial Horizon, 16.—Silvering Sextant Glasses, 17.—Observations for Azimuth, 17.—For Base-lines 18

Artificial horizons, 19.—Captain George's Horizon 19

Compasses.—Prismatic, 20.—Pocket 21

Watches.—The description of Watch most useful to a Traveller, by J. BROCK, 23.—On carrying Chronometers, by Sir G. BACK, 24.—On a Composition for keeping Watches or Compasses water-tight, by J. BROCK 24

Barometers and their Substitutes, 25.—To fill a Glass Tube with Mercury, for a temporary Barometer, 26.—Aneroid, 26.—Boiling-point Thermometers, 26.—Tables, 28.—Barometrical Tables .. 30

Theodolites or Altazimuth Instruments, by Colonel J. T. WALKER, 32.—Remarks on the Manipulation of Altazimuth Instruments, 36.—Determinations of Time, Azimuth, Latitude and Longitude, with a Transit Theodolite, 37.—Adjustments of the "Everest Theodolite, improved," by GROVER 43

Meteorological Instructions 45

Photography, by DR. POLE, 47,—also by the Rev. H. B. GEORGE .. 51

On the Projection of Routes, by Staff-Commander C. GEORGE, R.N. 53

Table for rough Triangulation, without the usual Instruments and without Calculation, by F. GALTON 63

Measurement of the number of cubic feet of Water conveyed by a River in each Second 65

Paper Squeezes, by the Rev. F. W. HOLLAND 66

Collection of Objects of Natural History, by H. W. BATES 67

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED DECEMBER 18TH, 1871.]

SESSION 1871–72.

HINTS TO TRAVELLERS.

INTRODUCTION.

APPLICATIONS are frequently made by travellers to the Royal Geographical Society, for instructions by which they may make their labours useful to Geography.

The Council have always shown themselves disposed to pay considerable attention to such applications, when they proceed from persons who are zealously engaged in preparing themselves for arduous enterprises.

If a specific question be addressed to the Council on some particular instrument or point of equipment, they usually refer it to a Fellow of the Society, whose experience might enable him to afford a satisfactory answer. But a question of a more general nature, on the best instrumental outfit for an inexperienced traveller, is of such frequent occurrence, and demands so lengthened a reply, that the Council thought proper some years ago to appoint a Committee * for its full consideration. The Report of that Committee was printed in vol. xxiv. of the Journal of the Society, and was extensively circulated under the title of 'Hints to Travellers.' When this edition became ex-

* This Committee consisted of Admiral FitzRoy and Lieut. Raper, R.N., and contained papers by Admirals Smyth and Beechey, Colonel Sykes, and Francis Galton, Esq.

hausted, we were requested to take the opportunity of making a thorough revision of the work. This we did, and now that the second edition is out of print, we have again carefully revised the pamphlet. The present edition of the 'Hints to Travellers' will therefore form the answer of the Council, to whomsoever may request information, on the subject of which it treats.

The following remarks are to be understood as addressed to a person who, for the first time in his life, proposes to explore a wild country, and who asks, "What astronomical and mapping instruments, and other scientific outfit ought I to take with me? and what are the observations for latitude and longitude, on which I should chiefly rely?" To this end we give a list of instruments, books, and stationery, complete in itself, so that an intending traveller may order his outfit at once. He would then be satisfied that no object of real importance had been omitted, that he had bought nothing superfluous, and that the different items corresponded together in power and in their several uses.

Lists drawn up by different travellers of experience would undoubtedly vary, for there is considerable difference in their practice; but an explorer would never do wrong, who followed to the letter the list we are about to give. His danger lies in adopting scattered hints from many sources, and starting with instruments which, though severally good, are, when considered as a set, incongruous and incomplete; and, secondly, in trusting to the advice of observers who have little experience of the bush.

The outfit we recommend, based on the use of sextants and the mercurial horizon, would suit an explorer in any part of the world, who desired the means of bringing back as good geographical results as the earlier explorers of large tracts of land have ever yet succeeded in obtaining. And in this list, professedly compiled for an inexperienced observer, simple and well-known instruments alone find a place. We are very far indeed from thinking that makers of sextants have yet met all the

wants of land travellers, but we *know* that good results may be obtained by such instruments as are to be bought from any good optician. We therefore urge a young explorer to make *these* his mainstay; and if he takes other instruments, to do so more for the purpose of testing and reporting on their performances, than of relying in entire confidence upon them. Again, it is hazardous for a man hastily preparing himself for a journey, to order new apparatus from a maker; he cannot be sure that it will be well made or ready in time, and he may have to set sail in the possession of a strangely-shaped instrument—very delicate, difficult to pack—whose adjustments he has not had opportunity of mastering, and on which it is unlikely he will obtain information after his departure; whilst, if he determines on buying a sextant, and other well-known instruments, he may make his selection out of great numbers that are always to be found on sale, and practise himself in their use, under the tuition of the officers of the ship, during the whole of his voyage from England. It is therefore our object to give a list of instruments with which we advise a traveller of little experience to provide himself, and which will be found thoroughly adequate to do his work.

It should be borne in mind that travellers can seldom attain accuracy in their observations, perhaps hurriedly made, during a first exploration. Latitude within $\frac{1}{4}$ of a mile, and longitude within $\frac{1}{4}$ of a degree, is a somewhat better result than is usually obtained.

OUTFIT.

Examination of Instruments.—Let every Instrument be tested and its errors determined and tabulated at the Kew Observatory. This is done for a trifling fee. The following are some of the present charges, they have undergone occasional small changes:—Ordinary thermometers, 1*s.*; boiling-point thermometers, 2*s.* 6*d.*; ditto, very carefully, by the method of "calibration," 5*s.*; marine and portable barometers, 10*s.*; prismatic compasses, 2*s.* 6*d.*; superior sextants, 5*s.*; Unifilars, dip circles, and other magnetic instruments are also verified. The carriage of the instruments to and from the Observatory to be paid. Address—"Superintendent of the Kew Observatory, Richmond, Surrey." The establishment lies ten minutes' walk from the *Richmond* railway station, and is reached through a farm-yard, leading into a large meadow. This observatory was established and conducted by the British Association,

but is now maintained through a large donation, made by J. P. Gassiot, Esq., F.R.S., and is under the direction of a Committee appointed by the Royal Society. Any persons ordering instruments from opticians may direct them to be previously forwarded to Kew for verification.

Packing.—It is difficult to give general rules, because the modes of transport vary materially in different countries. Inquiry should be made by the intending traveller at the Royal Geographical Society's rooms, as to what would be the best for him. The corners of all the instrument cases should be brass-bound; the fittings should be screwed, and not glued; and the boxes should be large enough to admit of the instruments being taken out and replaced with perfect ease. Instrument-makers are apt to attend overmuch to compactness, making as much as possible go into a small solid box, which can easily be put on a shelf; but this is not what a traveller wants. Bulk is rarely a difficulty to him, though weight is; and, above all, it is most important that he should be able to get at his instruments easily, even in the dark. Also a large light box suffers much less from an accidental concussion than a small and heavy one. Thermometers travel best when slipped into india-rubber tubes. A coil of such tubing will serve as a floor, to protect a case of delicate instruments from the effects of a jar. Horse-hair is of use to replace old packing, but it has first to be prepared by steeping in boiling water, twisting into a rope, and, after it is firmly set, chopping it into short pieces. The hairs retain their curvature and act as springs. Instruments travel excellently when packed in *loose, tumbled* cloths.

Sextant for regular work—

A sextant of 6-inch radius, light in weight, by a first-rate maker, divided on platinum, to ten minutes. It must have a moveable ground-glass screen in front of the reading-off lens, to tone down a glaring light. (As regards a level, attached to the arm, see 'Knorre's Method,' &c., p. 16.)

The handle must be large and convenient; the box large enough to hold the instrument with its index clamped to any part of the arc, and the place for the telescopes long enough to allow of their being put into the box when set at focus, with their tubes pulled out.

Stand, a stout tripod stand, such as is employed for photographic cameras of moderate size, fitted with a universal joint and a counterpoise. The use of this, when kneeling or sitting on a low stool, vastly increases the facility of making delicate lunar observations.

Sextant for detached expeditions, and for taking altitudes when the other sextant is in use for lunars—

A sextant of 3-inch radius, graduated to half-degrees, in a leather case, fitted to slip on to a leather belt, to be worn round the waist, when required.

Mercurial Horizon—

One of the usual construction. Its trough must not be less than 3½ inches, inside length, and of the usual construction for filtering the mercury when it is poured in. The glass screen should fold, and be large enough to cover the trough without touching it. It must be by a first-rate maker, for inferior glass distorts the image. *Reserve:* one spare glass and an iron 3 or 4 ounce bottle of mercury.

One of Captain George's small horizons (*see* p. 19) to use on detached expeditions and occasional purposes.

Watch—

A good strong silver watch, not too heavy, with an open face and a second hand: it must wind up at the back. The hands should be black steel, long enough to cover the divisions. The divisions should be very clear and distinct. See that the second hand falls everywhere truly upon the divisions. *Reserve:* at least two other watches of the same character; these should be rolled up separately, each in a loosely-wrapped parcel of dry clothes, and they will never come to harm; they should be labelled, and rarely opened. The immediate envelope should be free from fluff or dirt. Covers of chamois leather should be washed before use. Half-a-dozen spare watch-glasses, fitting easily—two to each watch. Three spare watch-keys; one might be tied to the sextant-case, one wrapped up with each watch. *See* p. 23 for further particulars.

Compass—

A prismatic compass, graduated on aluminium, from 0° to 360°, with a shield of brass cut out here and there, to admit light, fixed over the glass. *Reserve:* one spare glass.

Two pocket compasses, from 1¼ to 2 inches in diameter. Their needles must carry cards graduated from 0° to 360°, and not twice over from 0° to 180°, in addition to the points. A line for True North, temporarily marked on the cards, in the position most appropriate to the magnetic variation at the country about to be visited, may be found convenient. These compasses should be light in weight, have plenty of depth, and be furnished with catches, to relieve the needle from its pivot when not used. The needles should work steadily and quickly: such as make long, slow oscillations are to be avoided. Cards, half black and half white, are recommended. (*See* p. 20 for further particulars.)

Lantern—

To be used with oil, and furnished with a large wick. See that there is abundant supply of air from air-holes in the *sides*; these are essential when the lantern is set upon the ground. Also that all the internal fittings can be removed and cleaned, and that they are solidly made, not merely soldered. It should be furnished with a reflector, to throw a clear light forwards and *downwards*. A good lantern is *most* important. A small ball of spare wick. Oil of the best quality. Wax tapers, for use on detached expeditions.

Thermometers—

Three short and stout boiling-point thermometers, and a small copper vessel, to fit into the top of the lantern, to boil the water in. (*See* p. 26.)

Three ordinary thermometers, which should be graduated from 10° or more below the freezing- to above the boiling-point.

Standard thermometers, at a charge of 1*l.* each, graduated at the Kew Observatory, may be obtained thence, on the application of any Fellow of the Royal Society, or Member of the British Association.

Aneroids—

Large pocket size (2½ inches across), capable of working without fracture over the highest mountain pass that is expected. Two are required, because simultaneous observations are important. Recollect that such observations, taken even at a great distance apart, are of value; because

the variation of the barometer, even in the latitude of England, in ordinary weather, hardly ever exceeds a quarter of an inch in a hundred miles. Aneroids are excellent for most differential observations, but unreliable for absolute ones. They are uncertain at high altitudes.

Mapping Instruments—

A small case of drawing instruments, containing, among other things, hair-compasses, beam-compasses, drawing-pen, and rectangular protractor.

Protractors: one circular, of metal, of 5 or 6 inches in diameter; one of horn, 5 inches, all graduated, like your compasses, from 0° to 360°.

A graduated ruler of 1 foot or more, in metal; 2 dozen artists' pins. Medium size measuring tape, say 12 yards; pocket ditto, 2 yards.

Memorandum.—We have designedly omitted from this list both *chronometers* and *mountain barometers*, on account of their proved difficulty of transport without injury, and the frequent disappointments they have caused, even to very careful travellers.

Stationery—

An artist's board, not less than 8 inches by 13, made of light, well-seasoned mahogany and what cabinet-makers call "framed," to rule and draw upon.

Plenty of good ordinary paper. Note-books (not "metallic," for prepared paper wants strength, and the leaves of such books are constantly torn out and lost; they are also damaged by wet). They should be all of one size, say 5 inches by 3½, or larger. A leather pouch, secured to the waist-belt, having a flap buttoning easily over, to hold the note-book in use.

Two (or three) MS. books of strong ruled paper, foolscap size, each with a leather binding; the pages should be numbered, and journal observations, agreements, and everything else of value, written in them.

A sheet of blotting-paper cut up and put here and there in the ledgers.

Transparent cloth or paper. } For tracing.
Carbonised paper. }

Marquois's scales, for ruling parallel lines at definite intervals.

Blank maps, ruled for the latitudes and longitudes of the proposed route.

Plenty of brass pens and holders; also fine drawing-pens (steel crowquills) and holder. FH pencils; HB ditto.

Penknives. India-rubber cut up in bits.

Ink-powders of a kind that do not require vinegar. Red ink.

Paints for maps, viz., Indian ink, sepia, lake, cobalt, gamboge, oxgall, in a small tin case.

A dozen sable paint-brushes.

Materials for "squeezes," if travelling where inscriptions may have to be copied. (*See* p. 66.)

Books—

Raper's Navigation Tables; or, in default of these, either Inman's, or Norie's.

Weale's Tables are convenient from their compactness.

Shadwell's Cards of formulæ. (Potter, 31, Poultry, London. 2*s.* 6*d.*) With the help of this little publication the traveller, who has any mathematical knowledge, will thoroughly understand what he is about, and he may dispense with the usual cumbrous navigation tables, confining himself to ordinary tables of logarithms. But we have recom-

mended that all travellers should be furnished with those navigation tables, because they afford at a single reference what otherwise requires additional trouble to obtain.

'Nautical Almanac' for current and future years, strongly bound.

Three or four almanacs, such as that of Hannay and Dietrichsen. They give a vast deal of information, are useful to take on detached expeditions, also to cut tables out of.

Tables for barometers and boiling-point thermometers, to be procured at the instrument-maker's, or cut out from Guyot's elaborate meteorological tables, published by the Smithsonian Institution, New York.

Celestial Maps (uncoloured) pasted on calico (and learn how to use them).

The best maps of the country you are going to visit, that are to be obtained.

Admiralty Manual for the use of Travellers.

Mem.—Chauvenet's Astronomy (New York, 2 vols.) is one of the most complete and thorough of the mathematical works on geodesy and astronomical observations.

Additional Instruments, not necessary, but convenient.

Theodolites. (See p. 32.)

Telescope—

A large naval or deer-stalking telescope, for observing eclipses of Jupiter's satellites and occultations of small stars. It should not be less than 2 feet focus; it should have as large an object-glass as possible, astronomical eyepieces of from 45 to 60 magnifying power, and be fitted with a micrometer. (*See* p. 19.) The traveller should test it on the satellites, and be himself satisfied that he can see them perfectly well through it, before concluding the bargain. An ordinary telescope is wholly inadequate for that purpose. A clamp, with a universal joint and a cutting screw, to force into a log of wood, to support the telescope. The tripod stand already spoken of (*Sextant*) may easily be adapted to hold the clamp, but be sure that the telescope, when so arranged, can be pointed to stars directly above head, as well as to those nearer the horizon. A solid stand and easy movements are necessary to a powerful telescope, because slight tremors destroy its usefulness and the star or planet has to be watched and followed persistently, often in positions very inconvenient to the observer.

Plane table is very useful and almost essential for careful surveys of small tracts of country and for those topographical details which interest an antiquary. That by Lendy is one of the best, and its adjuncts are very complete. It would replace the artist's board mentioned above. The same tripod stand would serve for this that is used for other instruments.

Stop-watch, or pocket chronometer.

Pedometer.

Empty barometer tubes, and an iron bottle of mercury for filling them, to be used at a few important stations. (*See* p. 26.)

Pocket level (Abney's), with a mirror to show where the bubble is, when it is held to the eye. It serves as a clinometer, as well, for the measurement of slopes.

Maxima and minima thermometers. } For meteorological observations, *see*
Rain gauge. } p. 45.

Extracts from a Letter from JOHN KIRK, M.D., F.L.S., &c.

When Dr. Livingstone and I crossed the mountains and reached Lake Shirwa, our outfit was as follows: one 6-inch sextant, one mercurial horizon, one pocket chronometer, two prismatic compasses, one pocket compass, one field-glass, one aneroid barometer, two common thermometers, two boiling-point thermometers (the brass apparatus commonly supplied is quite superfluous), botanical paper, arsenical soap, one wide-mouthed bottle containing spirits of wine, pocket-lens, knives, note-books, water-colours, mathematical tables, nautical almanack, and wax candles.

The sextant and horizon were under the care of one man. They are on no account to be contained in the same box, partly from the danger of escape of mercury, but more especially to avoid the severe shock which so heavy a weight receives when placed on the ground, or should it happen to strike against a rock or tree; and these are contingencies to be expected. When carried, the limb should be very lightly clamped on the arc. We found no better plan when on the march than having the sextant and horizon fastened to opposite ends of a bamboo or stick, and carried over the shoulders of one of the porters. All the other instruments not carried by ourselves were packed among the other baggage. We read off the sextant by the help of the wax candles, which, from the stillness of the nights, we were able to use in the open air. On a short journey such an outfit is all that can be desired.

SEXTANT OBSERVATIONS.

The learner must recollect, that although the sextant, almanack, and logarithmic tables taken by land travellers are identical with those used at sea, yet the observations of the landsman and his whole method of ordinary work have quite a different character to those of the navigator. Therefore much will be found in works written for the use of navigators, which the landsman does not want, and, on the other hand, the problems he most requires are not those to which such works give most of their space. This is owing to several reasons, of which the following are the chief:—

1. A sailor is obliged to measure his altitudes from the sea horizon, which is rarely distinct in the night time, and therefore he mainly depends on the sun. The landsman is obliged to measure his altitudes from the mercurial horizon, and mainly observes stars; because the double meridian altitude of the sun is frequently out of the range of his sextant, and a mid-day halt may be inconvenient. The use of stars and the mercurial horizon introduces difficulty on the one hand, and great refinement on the other.

2. In an ordinary sea voyage, the accuracy required for the mapping of a country is of no use; neither could the sailor attain to such accuracy, if he wished it. First, because of the uncertainty of the effects of refraction upon the apparent position

of the sea horizon; secondly, because the mercurial horizon gives a double altitude, and therefore double precision to the result; so that a sextant of 3 inches radius on land has the efficacy of one of 6 inches at sea; and, thirdly, because the unsteadiness of the ship interferes with the free use of the inverting telescope.

3. The sailor carries Greenwich time with him by means of his chronometers. A landsman cannot trust to chronometers. He must find Greenwich time by the independent means of lunars, satellites, occultations, or moon-culminations.

4. Positions in the open sea, that cannot be determined by astronomical observations, are roughly laid down by Course and estimated Distance from the last fixed station. On land, they can be laid down with great accuracy by triangulation.

5. The unsteadiness of the ship makes observation of the satellites, or of occultations of stars, an impossibility to sailors, while they are exceedingly easy and convenient to land travellers.

6. Magnetic variation has to be found constantly at sea, owing to the rapid change of position and the iron in the ships. On land but few, though careful, observations are required (avoiding magnetic rocks).

General Remarks on Observing.—Endeavour with much forethought to *balance* your observations. Whenever you have to take a star's altitude for time east, select and wait, if you have time to do so, for another star as nearly as may be of the same altitude west, and use the same telescope, horizon roof, &c. If a meridian altitude be taken north, choose another star of similar altitude, and take it south; so also with lunars. In this way your observations will be in pairs, and the mean of each pair will tend to be independent of all constant instrumental and refraction errors; and by comparing the means of these pairs, one with another, you will know your skill as an observer, and estimate with great certainty the accuracy that your results have reached. Never rest satisfied with your observations, unless you feel sure that you have gained means of ascertaining the limit beyond which you certainly are not wrong. Weight all your observations; that is, when you write them down, put "good," "very good," "doubtful," &c., by their sides.

Nature of Observations:—

For Latitude—

1. The meridian altitude of the sun or stars is the simplest and safest. Altitudes of stars in pairs, N. and S. of the zenith, at or very near to the meridian, afford the perfection of accuracy.

It is to be understood that several altitudes should be read off, and time noted during the 5 or 10 minutes before and after the meridian passage.

2. The altitude of the Pole-star is a ready method in the northern hemisphere, but only available with an ordinary sextant and mercurial horizon between the N. lats. of about 15° and 60°. Nearer the Equator it is too low for the mercurial horizon, and nearer the Pole it is out of the range of the sextant.

3. By three altitudes of the sun or a star taken near the meridian, at *equal intervals of time*, and not necessarily restricted to the same side of the meridian. (*Chauvenet.*)*

4. When the sky is partly clouded, secure whatever stars you can surely identify, in case the meridian altitude should be lost. Almost any two stars, with the interval noted, are sufficient for the determination of the latitude, by the more or less troublesome calculations described in works on navigation. It is better to observe one or two additional stars as a check against mistake.

For Longitude by lunars, &c.—

Whenever you intend to observe for longitude, make a regular night of it; working hard and steadily, so as to accumulate a mass of observations, at a limited number of stations.

1. Lunar distances. No method is more serviceable than these. They should be made in pairs, with stars E. and W. of moon, and nearly equidistant from it. Also the thermometer and barometer (or its equivalent, a thermometer in boiling water) should be noted, and the refraction corrected accordingly; because, if thermometric and barometric corrections be omitted, in observations made on a high and heated plateau, there will be serious errors in the results.

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* Let a_1, a_2, a_3, be the three altitudes (it is better that none of them should be more than $\frac{1}{2}$ hour from the meridian); A the required meridian altitude; then if

$$q = \frac{[\frac{1}{2}(a_1 \frown a_3)]^2}{a_2 - \frac{1}{2}(a_1 + a_3)},$$ q being expressed in seconds of arc, $A = a_2 + q$.

The meridian altitude being thus determined, the latitude can be found in the usual manner. (This is a slight but convenient modification of Chauvenet's formula, by Admiral Shadwell.)

(*Example*)

$a_1 = 43° 8' 20''$ $a_2 = 43° 15' 30''$ $a_3 = 43° 4' 0''$

$\frac{1}{2}(a_1 + a_3) = 43\ 6\ 10$

$a_2 - \frac{1}{2}(a_1 + a_3) = 9\ 20 = 560''$

$\frac{1}{2}(a_1 \frown a_3) = 1\ 5 = 65''$

hence $q = \frac{65^2}{560} = 8''$, and $a_2 + q = 43° 15' 38''$

A complete pair of lunars, made wholly by one person, consists of the following observations, *in addition to those for latitude.* None of them may be omitted.

An hour before beginning to observe, get everything in perfect order; see that the lamp is well trimmed, its air-holes free, and that it is filled with oil. Also rehearse the expected observations, that no hitch may occur after they have commenced. Then let the hand and eye have ample time to repose, and go on as follows:—

1. Read thermometer in air.
2. Adjust horizon-glass, if necessary.
3. Two pairs of observations for index error.
4. Three altitudes for time, star E.
5. Three altitudes for time, star W.

A
6. Five lunar distances, star E. of moon.
7. Five lunar distances, star W. of moon.
8. Three altitudes for time, star W.
9. Three altitudes for time, star E.

10. Two pair of observations for index error.
11. Read thermometer in air.
12. Read barometer (or its equivalent, as thermometer in boiling water).

The series A may be repeated over and over again, so long as the eye and hand can be surely depended on.

2. Occultations give the longitude with great accuracy, but those of stars of the fifth and higher magnitudes, which are easily seen with an ordinary telescope, very rarely occur. Stars of the sixth magnitude are given in the Nautical Almanack, and are less unfrequent; but it requires a good telescope, such as that mentioned page 11, to see them. With such an instrument, many stars not mentioned in the Almanack may be seen occulted under favourable circumstances,—that is, when the moon is not too bright, and when it is her dark limb which occults. A careful traveller should make it a point, when at any important station, to turn his telescope on to the moon, as soon as it is dark, to see if there be a probability of any such occurrence, for it is easy, after a little practice, to tell whether the moon is likely to sweep over any star visible within three or four hours of her position. Before your departure, or when you have leisure, calculate for yourself, or get some one to calculate for you, all the stars you could by any possibility see occulted. Shadwell's Tables for facilitating the approximate prediction of occultations and eclipses at any particular place (Bate, 21, Poultry) are very convenient for this purpose. Out of the list in the Nautical Almanack, perhaps

not one quarter are available,—the occultation occurring either when the star is below your horizon or in the daytime.

3. Jupiter's satellites occur somewhat more frequently than occultations. They give fair results, and are most convenient approximations to a traveller; for they require no calculation at all, except for local time.

Notes on Observing with a Sextant. By FRANCIS GALTON, F.R.S.

It may save trouble to others if I mention here the way which, after many trials, I adopted of observing with a sextant. During the daytime I made out a list of the stars that culminated at convenient hours, and their expected altitudes. I set my watch by sunset, if it was very wrong, and took care that the minute hand went in correspondence with the second hand; that is to say, that the minute hand was truly over a division when the second hand pointed 0 seconds. If they did not go together, I moved the minute hand till it was rightly set. Then I spread my rug north and south in an open spot of ground, trampling down the bushes and long grass round it. Next, when the time of observing approached, I lighted my lantern and set it on the ground in front of my rug; to this I brought all my instruments, and first spreading a small cloth to the right of the lantern, I set my horizon on it, filled it with mercury, and covered it with a glass. The cloth was to catch any mercury that might be spilled. I then propped up my watch to the left of the lantern, laid down my note-book, with the leaves tied open, and taking out my sextant, adjusted it to the expected altitude, and screwing on the telescope, which always was kept at my focus, I laid myself flat down on the rug. Then taking off the roof from the horizon, if there happened to be no wind, and turning the glare of the lantern away from my eyes, and upon the watch, I made an accurate contact of the star with its reflected image; then looking quickly round, I observed the watch. I now turned the lantern towards me, changed hands with the sextant, read off and wrote down, then turned the lantern back on the watch, and recommenced. For a meridian altitude I read off and wrote down about ten observations, both time and altitude, beginning a little before the star reached the meridian, and continuing after it had perceptibly sunk; it was thus easy to estimate the meridian altitude with accuracy. For greater refinement, in order to measure an important base-line, I occasionally protracted these altitudes, and drew a curved line through them with a free hand, to guide my judgment in estimating the meridian altitude. For lunars, I took time with my second sextant before beginning; also two or three times during the progress of the lunar, and finally at the close of all. I was thus very independent of the good going of my watch, for, by observing every half-hour, no watch that went at all could go far wrong.

KNORRE'S *Method of bringing the Reflexion of a Star from the mirrors of the Sextant, into contact with the Reflexion of the Star in the Mercurial Horizon.*

In the observation of the altitude of a star with the artificial horizon, it requires some practice to find the image of the star reflected from the sextant mirrors; and sometimes, when two bright stars stand near each other, there is danger of employing the reflected image of one of them for that of the other. A very simple method of avoiding this danger, by which the observa-

tion is also facilitated, has been suggested by Professor Knorre, of Russia. From very simple geometrical considerations it is readily shown that at the instant when the two images of the same star—one reflected from the artificial horizon, the other from the sextant mirrors—are in coincidence, the inclination of the index-glass to the horizon is equal to the inclination of the sight-line of the telescope to the horizon-glass, and is, therefore, a *constant angle*, which is the same for all stars. If, therefore, we attach a small spirit-level to the index-arm, so as to make with the index-glass an angle equal to this constant angle, the bubble of this level will play, when the two images of the star are in coincidence, in the middle of the field of view. With a sextant thus furnished, we begin by directing the sight-line towards the image in the mercury; we then move the index until the bubble plays, taking care not to lose the image in the mercury. The reflected image from the sextant mirrors will then be found in the field, or will be brought there by a slight vibratory motion of the instrument about the sight-line.

It is found most convenient to attach the level to the stem which carries the reading-glass, as it can then be arranged so as to revolve about an axis which stands at right angles to the plane of the sextant, and thus be easily adjusted. This adjustment is effected by bringing the two images of a known star, or of the sun, into coincidence; then, without changing the position of the instrument, revolving the level until the bubble plays. (*Extracted from Chauvenet.*)

Silvering Sextant Glasses—

(Extract from 'Nautical Surveying,' by Admiral Sir E. BELCHER, pp. 9, 10.)

The *requisites* are clean tinfoil and mercury (a hare's foot is handy)—lay the tinfoil which should exceed the surface of the glass by a quarter of an inch on each side, on a smooth surface (the back of a book), rub it out smooth with the finger, add a bubble of mercury, about the size of a small shot, which rub gently over the tinfoil until it spreads itself and shows a silvered surface, gently add sufficient mercury to cover the leaf so that its surface is fluid. Prepare a slip of paper the size of the tinfoil. Take the glass in the left hand, previously well cleaned, and the paper in the right. Brush the surface of the mercury gently to free it from dross. Lay the paper on the mercury, and the glass on it. Pressing gently on the glass, withdraw the paper. Turn the glass on its face, and leave it on an inclined plane to allow the mercury to flow off, which is accelerated by laying a strip of tinfoil as a conductor to its lower edge. The edges may, after twelve hours' rest, be removed. In twenty-four hours give it a coat of varnish made from spirits of wine and red sealing-wax. It may be as well to practise on small bits of common glass, which will soon prove the degree of perfection which the operator has attained.

Observations for Azimuth.—The true bearing of a heavenly body may be obtained by means of a sextant either from observations of altitude or from the apparent time. As the formula for obtaining the latter does not appear in many works on Navigation, it is given :—

Time.	Azimuth.	Month.	Day.		
H. M. S.	° ′	° ′ ″			
		Co. Lat. P. Dist.			
		Sum.			
		Diff.			
		½ Sum.	Cosec	Sec	
		½ Diff.	Sine	Cosine	
		½ Hor. ∠	Cotang	Cotang	
		Arc 1 = Tang			
Cor.		Arc 2.		Tang Arc 2	
	App. time				
	Hor. ∠	⊙ true Az. (= Arc 2 − Arc 1.)			
		⊙ mag. Az.			
	½	Variation.			
	½ hor. ∠ in Arc.				

Note.—Arc 2 is of the same affection as the ½ polar disc. and Co. Lat.: when one is acute so is the other, and *v. v.*

Add arcs 1 and 2, when polar disc. is greater than Co. Latitude.

Subtract " " less " "

The angular distance between the Pole-star, which is only 1° from the Pole, and any object on the horizon, affords an approximate and simple method of obtaining the true bearing: the formula for the reduction of the oblique to the horizontal angle is—

Reduction of Angle.

✱ and obj.	Cosine
✱ Alt.	Secant
Red. Angle	Cosine

The bearing of the Pole-star at all times, or any other celestial object, when near the meridian, affords aproximate means of obtaining, without calculation, the variation of the compass.

For Base Lines.—By Difference of Latitude—For base-lines the more rapid methods of attainment are alone suitable to explorers in wild countries. None of these measures is more accurate and speedy than that obtained by meridian altitudes of the same heavenly body (sun or star, not the moon) at different stations by the same observer with the same instruments. If the stations are on the true meridian, or nearly so, their difference of latitude is their distance; and if they are otherwise situated, their true bearing and their difference of latitude give the distance between them.

By Micrometer or Sextant, and Short Base. Should the traveller carry with him an astronomical telescope, it is advisable that it should be fitted with a micrometer for measuring small angles; care is, however, requisite in seeing that the board or object used for the base is accurately measured, and that it is at right angles to the line of sight. In the absence of the micrometer, the sextant will give a very fair approximation; the angle should, however, be measured both on and off the arc. Rochon's micrometer has been used with great effect in the geological survey of Canada.

Artificial Horizons.

Mercurial Horizon. — Altitudes taken by its means are thoroughly reliable only when the reflexions have been observed from the uncovered mercury; for it is difficult to procure glass, large enough for the cover, which does not sensibly distort the reflexions. Glasses made by Mr. T. E. Butter, 4, Belvidere Crescent, Belvidere Road, Lambeth, have a high reputation. The errors introduced by the interposition of glass may be partly got rid of by reversing the cover between each pair of observations.

When observing for "equal altitudes," morning and evening, be sure that you have the same face of the cover opposite to you on both occasions. One of the faces of the cover should be marked for this purpose.

The trough should not be less than 3¼ inches inside length, because the convex border of the mercury is useless, and its surface is foreshortened to the observer.

Captain George's Horizon. — A very ingenious, small, and handy mercurial horizon has been contributed by Staff-Commander George, R.N., Curator of Maps at the Royal Geographical Society, and is made by Messrs. Gould and Porter, successors to Cary, optician, No. 181, Strand. It consists of a disc of glass floating on mercury, in a vessel which it nearly fits, and it has an arrangement (applicable also to the common mercurial trough) by which the mercury is introduced, ready filtered, from an attached reservoir, and afterwards withdrawn, in a manner that saves a great deal of trouble. The glass floats without touching the sides of the trough, and the whole of the mercury below it is serviceable. A very small trough on this principle gives as wide a field of view as a large trough used in the ordinary way. There is yet another advantage, in that the reflexion of the glass causes its under-surface to be optically raised; therefore the edges of the trough cut off proportionately

less of the field of view. Also, at very low altitudes, the reflexion from the upper surface of the glass, which may rise above the edges of the trough, becomes so bright as to materially reinforce, and even supersede, the reflexion from the mercury below. Hence very low altitudes may be observed with this instrument. It has, besides this, the great advantage of peculiar steadiness, both when people are walking near it and during wind.

As regards its accuracy, when the glass is of the best workmanship, the mercury pure, and its surface quite clean, the results leave nothing to be desired; but, unless these conditions are *scrupulously observed*, errors of five, or more, minutes in the double altitude, or of half that amount in the single altitude, may be easily introduced. For these reasons, and as the instrument is a new one, we have not recommended that a traveller should be wholly dependent on it; but we recommended that one should be taken for occasional use, especially for purposes of azimuth by the sun, to be taken on mountain-tops (see p. 21), for detached expeditions, where a heavier instrument would be a serious incumbrance, and for the determination of heights on hills whose altitudes are too low to come within the range of an ordinary mercurial trough. We recommend that its glasses be examined and approved before it is taken, and that it be used discreetly.*

Before introducing the mercury into the trough, cleanse the trough thoroughly from dust, which will otherwise rise to the surface of the mercury, and, when setting the glass afloat, take exactly the same precautions as in silvering sextant glasses (*see* p. 17), by putting paper or thin silk first on the mercury, and the glass upon that, and then carefully withdrawing the paper from under the glass.

Compasses.

Prismatic Compass.—The prismatic compass is one of a traveller's most useful instruments. Its graduations should be engraved on an aluminum ring, both on account of the clearness of the divisions and the lightness of the material. When using it, if you have no tripod, make a pile of stones and

* If the traveller should ever doubt the performance of one of these horizons, he may easily test its accuracy by means of any telescope mounted on a stand, and furnished with cross wires. He should direct the telescope down towards the mercury and intersect with the cross wires the reflexion of some clearly defined fixed point; then reverse or otherwise disturb the horizon, and, after it has again settled to rest, observe whether the cross wires continue to intersect the point. It is safer to select a point at some distance, else, if the level of the mercury be raised or lowered during the trial, the results would be vitiated.

lay the cover of the compass on the top, with its bottom upwards; this makes a smooth table for the azimuth compass itself to be moved about on. Be on guard against magnetic rocks; it may happen that the bare peaks of high hills, which are the best of places for observing from, and which a traveller often makes great sacrifices to reach, will be found so magnetic as to make compass observations worthless. A small sextant should always be taken up on these excursions. It is of little use in a wild country to devote much time to getting accurate bearings, as the landmarks themselves are rarely well defined: the main endeavour should be not to mistake one hill for another, to judiciously select good angles, and to carry on more than one independent scheme of triangulations at the same time, by comparison of which the accuracy of the whole may be tested. It is surprising how much work may be thrown away by want of judgment; and also how much may be done, with very little trouble, by a person who has acquired a good eye and memory of country.

It is, perhaps, hardly necessary to call attention to the fact, that in prismatic compass-cards the south pole of the magnet is necessarily placed under the 360°, and the north under the 180°, because in these instruments the reading is from the nearer edge of the card towards its centre, whereas in an ordinary compass the reading is from the centre of the card towards its outer edge. It follows from this that the same compass card cannot be used indifferently with or without a prism. Moreover the figures intended for use with a prism, have to be drawn not like ordinary figures, but like figures seen in a looking-glass, in order that the reflection in the prism may show them straight.

Pocket Compasses.—The patterns on these cards have been greatly improved of late years. Until recently it was scarcely possible to meet with a compass capable of being read in a dim twilight, which is just the time when it is of most importance to a traveller. Representations of three cards, each of which has its advocates, are given here. They are of the larger size, already recommended in "outfit," viz. 2 inches in diameter. Fig. 3, called the Rob Roy Canoe pattern, is decidedly less distinct in the twilight than the others, especially than Fig. 1, but some travellers have preferred it on account of the legibility of the N.E., S.E., &c.

The better cards are made either of talc covered with paper, or of mother-of-pearl. Both of these materials are heavy and their weight, of course, tends to injure the point on which they turn, especially if they happen to receive a jar when they are resting on the point, and also to make their oscillations sluggish. These disadvantages are, however, less serious than those

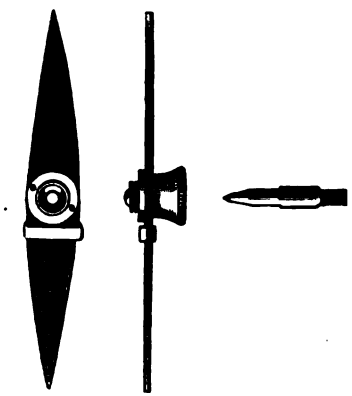
which attend the use of a common card, which warps with heat, and is spoiled by a wetting.*

A pocket compass suspended on gimbals practically comes to rest much more quickly than one that is held in the hand. This

Fig. 1.

Fig. 2.

Fig. 3.



Plan, Section, and Pivot of Needle.

* A disc of aluminum foil, procurable at Johnson, Matthey, & Co., 77, Hatton Garden, London, is only one-ninth part the weight of a mother-of-pearl card of the same size. It seems equally good as regards durability, and it can be shaped and lettered in any desired manner by embossed stamps or by perforations. But I have not yet succeeded in fashioning it into a clearly legible card. Perhaps some instrument-maker may be more successful.

Mem.—To read a compass or a watch in the twilight, when it is a little too dark for unaided vision, *use a strong magnifying glass.* Its effect in giving distinctness is extraordinary.—F. GALTON.

advantage is specially noticeable when it is growing dark, and when consulted on the side of a hill, for in either case it is difficult to judge of horizontality. It is most important to a traveller, whose caravan is on the march, that he should lose very little time when he is consulting his compass.

WATCHES.

Mr. J. Brock, chronometer maker, 21, George Street, Portman Square, who has usually been applied to by the Council of the Royal Geographical Society, to furnish the watches given by them to various travellers, has furnished the following information at the instance of the authors of this pamphlet:—

The description of Watch most useful to a Traveller. By J. BROCK.

The description of watch I should recommend as suitable for a traveller, or anyone who requires a good timekeeper that will stand a certain amount of rough wear without getting out of order, is a 14 or 16 size, full-plate lever watch, with an *adjusted* * compensation-balance and *tempered* balance-spring, cap over the works, sunk-seconds dial. Great care should be taken in marking the minutes upon the dial-plate, that they are exactly equal, or the traveller will have some difficulty to determine to which minute the seconds belong. The case should be of silver, without springs to open it, or hinges. The back that shuts over the part through which the key passes to wind up the watch, also the front that holds the glass, should snap tightly upon the other part of the watch-case. The glass should be of thick plate-glass, not less than one-eighth of an inch thick. The case, on account of the closeness of the fittings, will then be impervious to the dust, and would not easily allow water to get to the works.

A watch of this description cannot be sold for less than 16*l*., if the works are of a quality necessary for good performance, and the various adjustments are properly attended to, and is the lowest standard of watch that any traveller ought to be satisfied with.

A chronometer will keep more regular time in different positions than the watch I have described, but in rough wear I consider it more likely to break down, as it certainly is not so strong in construction as the lever watch. An ordinary watchmaker, with care, could put the lever watch in order, but few are competent to repair a chronometer.

Watches of any construction will be more regular in their daily variation, if care is taken to keep them in the same position during each 24 hours; that is, when in the pocket, the same hour should always be uppermost; and they should be worn the same number of hours each day; and if laid down at night, let them be so every night.

No one can alter the regulator of a chronometer but a competent watchmaker, but anyone may be able to alter that of the lever watch. The chronometer is certainly the best instrument for anyone who requires a correct

* Many watches have compensation-balances applied to them which have never been tested in the least, and have only the appearance of being adjusted, without the result. An ordinary watch, if mechanically correct, will vary nearly one minute per day for every ten degrees' change of temperature—J. B.

timekeeper; and with the recent improvements, is quite suitable for the pocket, but not so good for general purposes and rough wear as the lever watch.

On Carrying Chronometers. By Admiral Sir GEORGE BACK, F.R.S.

It is impossible to avoid jolting pocket chronometers or watches when worn about the person.

On three Arctic (overland) expeditions, mine (frequently two chronometers) were suspended in cloth pockets, hung round the neck by a strong narrow silk ribbon, and kept in their places by two other ribbons tied round the waist; the whole was secured by the waistband of the trowsers, which was made with six holes (three on each side), to lace behind. A silk string, passed through eyelet-holes round the top of the pocket and tied, secured the chronometer in its place, and prevented wet and dirt from reaching it.

When travelling in summer, the chronometers were taken off at night and placed carefully in a hat, horizontally, or else in some blanket, under the upper part of the blankets forming the bed, where they were more out of the way of accidents; but in winter they were worn all night against the body, to protect them from the effects of the cold.

We (Franklin, Richardson, Kendall, &c.) never complained of finding "fluff," in the cloth pocket, and I do not know of an instance of the chronometers getting wet.

Franklin fell between two pieces of ice into the water, over-head, and sunk fully two feet, and the two chronometers were not injured.

I do not recommend "Macintosh" for the pockets. In cold, *freezing* weather, our Macintosh cloaks became stiff as planks; and in very sultry weather, portions of the caoutchouc oozed through. Common linen or washed chamois leather would do for lining.

On a Composition for keeping Watches or Compasses watertight. By JAMES BROCK.

The method that I should recommend for preventing water from penetrating watch-cases, is the application of a preparation of beeswax and resin to the several parts where it is possible for the water to pass. The preparation I recommend should be composed of equal parts and well mixed. If it is for a very hot climate, the quantity of "resin" should be slightly increased. It may be kept prepared, and when wanted, a portion melted and applied to the several parts with a small brush or feather. If the watch is an ordinary *open-face*, with a SNAP bottom, the parts that should be attended to are—1st, the glass. Apply the preparation round it, and rub it in with the thumb, by which means it will be worked into any cavity. 2nd, open the glass and apply it round the part of the case upon which the glass shuts (be careful that you apply it to all the joints of the case), close the glass and squeeze it down tightly; what is squeezed out may be cleared away with the nail or a piece of wood. 3rd, open the back (where the watch is wound up) and apply the preparation in the same manner as just named. The case will require a little more force to open it, and the back should be attended to frequently. If the watch has a *hunting* (or double) case, or a *bottom that opens with a fly-spring*, the difficulty of keeping out the water is much increased, as there are so many openings into the case for the springs, &c. I should recommend that the springs be removed (which is easily done, as they are all screwed in), and that the holes through which they pass, also the *screw holes*, be stopped up with the preparation; also *remove* the *push-piece* from the pendant (this is done by taking out the screw, which passes through the bow), and stop up the hole from which it has been taken; but care should be used in doing so, as it is

essential that it should be stopped *below* the hole through which the screw of the bow passes. The bow may then be returned. The preparation should now be applied to the glass and the shutting parts, in the manner before described. The hunting cover will keep shut by nature of the preparation.

Barometers and their Substitutes.

The travellers for whose use these remarks are prepared, being possessed of sextants or theodolites, would measure mountains by triangulation from a distance, which is at once by far the simplest and most accurate method of doing so. But they also require, for the purposes of physical geography, to ascertain the height of the country where they are travelling, above the sea-level; and whenever they have to observe lunars on elevated plateaux, a knowledge of the barometric correction for refraction is essential to them. For these latter purposes, explorers must have recourse to barometers, or to their more or less imperfect substitutes.

A single barometric observation made in regions where the barometer ranges, as with us, through two or more inches, even in ordinary weather, is unreliable to half that extent; that is, to more than 1000 feet, in calculating altitudes; but the mean of several observations taken at chance intervals, at repeated visits, and during ordinary weather, is not likely to be far amiss. In tropical regions the barometer is very much more steady than with us, and the heights deduced from the observations of travellers are proportionately more to be depended on.

If a second station can be established, for simultaneous observations, at 100 or even at 200 miles' distance, their relative heights can soon be determined with some accuracy by the barometer, because the meteorological waves are so vast, that there is seldom a difference, in ordinary weather, even in these latitudes, of a quarter of an inch (or say 250 feet of calculated altitude) between two stations 100 miles apart.

The readings of barometers and boiling-point thermometers, when they are erroneous, nearly always err in the direction of assigning too great elevations, for the barometer, when air or damp gets into the tube, is depressed, and the thermometer, when heated by imperfectly-boiling water, stands lower than it should.

The barometric instruments are,—

1. *Barometer.*—For reasons already given (p. 10), no description of portable barometers is inserted here; but it must be recollected that *empty* glass tubes can be carried without much risk, and that they can be filled with mercury when required, and be set up or used temporarily as barometers. The method of doing this is as follows:—

To fill a Glass Tube with Mercury for a temporary Barometer.

Take the ladle used for melting lead for bullets, and scour it bright with sand. Prop the tube at a slightly inclined angle on the forks of two sticks, planted in the ground, and rake embers of the camp-fire below it. Turn it till thoroughly warm—almost too hot to touch. Strain the mercury through paper twisted into a cone. Boil it in the ladle. Heat some more mercury in a cup, and let everything cool again. When cool enough to handle, set the tube on end, upon a cloth, to catch overflows of mercury. Fill the tube to overflowing. Put the finger firmly on the top and reverse the tube, plunging the end that is closed with the finger, into the cup of mercury. Then remove the finger gently. If, on inclining the tube, the mercury rises to the top with a sharp tap, it has been filled to the exclusion of all air, and it will do. All that now remains, is to measure with a rule from the top of the mercury in the tube, down to the top of that in the cup. It will be found convenient to have two marks scratched on each tube—the one an inch from its open end, and the other at 30 inches' interval from the one below. Then if the lowermost scratch be brought level with the surface of the mercury, the distance from the uppermost scratch has alone to be measured, and this can easily be done. It will also be convenient to arrange some simple gear to hold the tube upright, after it has been filled, as it may be desirable to keep the barometer in action after it has been made, and not merely to take a single reading, and then to empty the tube. A power of doing this becomes necessary in conducting simultaneous observations, as when a party is detached to take barometric heights in the neighbourhood. It would be easy to arrange fittings inside the box, in which the tubes are packed, for that purpose.

The operation of filling a tube should be practised at home in comfort, with a properly-made barometer for comparison, and plenty of mercury to fall back upon, before trusting oneself to the difficulties of the open field. If mercury is spilt on the ground, it may always be recovered by patience and skill, aided with a little digging, whenever the globules run down out of sight.

Probably the safest way of packing empty glass tubes would be to slip india-rubber bands over them to prevent their striking together, and to pack them among plenty of stuffing in a long light box, well protected by leather pads on the outside edges against concussion.

2. *Aneroid.*—An excellent instrument for giving moderate differences of elevation in neighbouring places, as in the process of laying down the contour lines of a country, but quite unreliable for absolute heights, because its index error is apt to change to any amount without the traveller being able to ascertain, much less to make a just allowance for, the change.

3. *Boiling-point Thermometers.*—These have the great merit of portability without risk, and of a pretty constant, but not absolutely constant, index error; consequently, they are largely used by travellers. Though the operation of boiling a thermometer is very simple in theory, it is very troublesome in practice over an ordinary camp fire. Colonel Grant, who had, together with Captain Speke, great experience in the manipulation of these instruments, speaks very highly of the effectiveness of the boiling apparatus which he took with him from the Geographical Society, and which was fitted into the bull's-eye lantern he used for reading off his sextant at night. The "shade"

was removed out of the lantern, and the boiling apparatus was put into its place. It was a copper cup, set in a jacket pierced with air-holes. An horizontal tube with a screw nozzle pierced the side both of the jacket and of the cup, and the thermometer was passed through this tube. The thermometer passed through a cork fixed into the middle of a screw which was screwed into the nozzle. It requires, however, very careful trimming of the lamp to obtain sufficient heat to boil the water thoroughly. We are, as yet, unable to recommend any compact apparatus fit to be used with a lamp fed with common oil, which shall act with certainty in the hands of an average traveller. It is essential to accuracy, and also to the steadiness of the mercury in the thermometer, that its bulb should not touch the boiling water, but be thoroughly enveloped in the steam which issues copiously from it.

Apparatus, to be used with spirits of wine, is made by Casella, 14, Hatton Garden. A small "Russian furnace" is by far the most powerful kind of spirit-lamp, and the best for out-of-door work; it consumes no more spirit than the common lamp.

A tin pot, with a sliding tin cylinder inside, with holes for escape of the steam, and which admits of being pegged at the desired height, suffices, when a common fire is the source of heat. The thermometer is passed through a cork which is pressed into a hole in the lid, which fits firmly (like the lid of a pill-box) on the top of the inside tin cylinder. The fire must be made of bright clear embers to avoid trouble with smoke, and the pot must be securely propped on stones or hung like a gipsy kettle, for fear of a fall and of destruction to the thermometer.

The thermometer should be observed after the water has been boiling freely, but not too tumultuously, for three or four minutes; and at least four or five readings should be taken, at half-minute intervals. Though pure water ought to be used, yet any water that is not very hard will suffice for a traveller's ordinary need.

Having obtained the boiling points, it remains to determine the value of the indication of barometric pressure from the following Tables, which are fairly approximate, and will serve in the absence of Guyot's collection or others. Supposing the thermometer to have been boiled at the foot and at the summit of a mountain, deduct the number in the column of "total altitude of feet" opposite the boiling point, as observed below, from the similar number corresponding to the boiling point above: this gives a roughly approximate height, which must be corrected for the temperature of the air between the two stations, in order to obtain a more nearly correct altitude. This correction is made by multiplying the nine hundredth part of

the altitude already obtained, by the difference between the sum of the temperatures at the two stations and 64°. This correction is *additive* when the sum of temperature exceeds 64°, otherwise it is subtractive. This latter is the case, when the mean temperature of the air at the two stations is below the freezing point:

	°	Feet.
Boiling point at summit of the hill	204·2	= 4027
„ its foot	208·7	= 1690
Approximate height		2337

Temp. of the air below ..	75°
„ „ above ..	83
Sum	158
	64
	94

Also $\frac{2337}{900} = 2{\cdot}6$ (nearly enough.)

For the correction, 94 × 2·6 =	244 (additive.)
Approximate height	2337
	2581 feet, corrected altitude.

TABLE I.—To find the Barometric Pressure and Elevation corresponding to any observed Temperature of Boiling Water between 214° and 180°.

Boiling Point of Water.	Corresponding Height of Barometer.	Total Altitude in Feet from 30·00 in. or the Level of the Sea.	Value of each Degree in Feet of Altitude.	Proportional Part for One-tenth of a Degree.	Boiling Point of Water.	Corresponding Height of Barometer.	Total Altitude in Feet from 30·00 in. or the Level of the Sea.	Value of each Degree in Feet of Altitude.	Proportional Part for One-tenth of a Degree.
°		Feet.	Feet.	Feet.	°		Feet.	Feet.	Feet.
214	31·19	−1013	..	..	196	21·71	8407	543	..
213	30·59	507	−504	..	195	21·26	8953	546	..
212	30·00	0	−507	..	194	20·82	9502	548	55
211	29·42	+ 509	+509	51	193	20·39	10053	551	..
210	28·85	1021	511	..	192	19·96	10606	553	..
209	28·29	1534	513	..	191	19·54	11161	556	..
208	27·73	2049	515	..	190	19·13	11719	558	56
207	27·18	2566	517	52	189	18·72	12280	560	..
206	26·64	3085	519	..	188	18·32	12843	563	..
205	26·11	3607	522	..	187	17·93	13408	565	57
204	25·59	4131	524	..	186	17·54	13977	569	..
203	25·08	4657	526	..	185	17·16	14548	572	58
202	24·58	5185	528	53	184	16·79	15124	575	..
201	24·08	5716	531	..	183	16·42	15702	578	..
200	23·59	6250	533	..	182	16·06	16284	581	..
199	23·11	6786	536	..	181	15·70	16869	584	..
198	22·64	7324	538	54	180	15·35	17455	587	59
197	22·17	7864	541	..					

When the boiling point at the upper station alone is observed, we have no option but to *assume* 30·00 inches, or a little less, as the average height of the barometer at the level of the sea. The altitude of the upper station is then at once approximately obtained by inspection of Table I.; correcting for assumed temperature of the air at the sea level. The serious inaccuracy to which the above assumption may lead, and its possible prevention by repeated observations at intervals extending over a considerable period, has already been pointed out.

The small but complete tables, next page, will be especially useful to those who carry a mountain barometer and are anxious to make accurate determinations, but are not furnished with larger tables. These are calculated by Loomis, and are extracted from Guyot's collection.

Part I. gives the altitude, subject to correction, for the temperature of the air, and for the other influences which are the subjects of Parts II. III. IV. and V.

Method of computation.—(1) Take from Part I. the two numbers corresponding to the two barometric heights; (2) from their difference subtract the correction found in Part II., with the difference between the thermometers that are attached to the barometers (*Mem.* this correction is not wanted for aneroids, for their works are mechanically compensated for temperature); (3) multiply the nine hundreth part of the value already obtained by the difference between the sum of the temperatures at the two stations and 64°. This correction is additive when the sum of the temperatures exceeds 64°, otherwise it is subtractive; (4) for further precision take corrections from Parts III. and IV., also from Part V., when the lower station is so high as to bring the case within the range of that table:—

(*Example*)	Upper Station.	Lower Station by Sea.
	°	°
Thermometer in open air	70·3	77·5
Thermometer in barometer	70·3	77·5
Barometer	23·66	30·046
Latitude 21°.		
Part I. gives for 30·046 inches		27,649·7
Part I. gives for 23·66 inches		21,406·9
Difference		6242·8
Part II. gives for 77°·5 − 70°·3 (=7°·2)		−16·9
Approximate altitude		6225·9
$\frac{6225\cdot9}{900} + \{77°\cdot5 + 70°\cdot3 - 64\} = 6918 \times 83\cdot8$		+579·7
Nearly correct altitude		6805·6
Part III. gives for above altitude and latitude 21 ..		+13·3
Part IV. gives for above altitude		+19·3
Part V. is not used in this case		0·0
Correct height above sea		6,838·2 feet.

PART I.

ARGUMENT, THE OBSERVED HEIGHT OF THE BAROMETER AT EITHER STATION.

Inches.	Feet.	Diff.	Inches.	Feet.	Diff.	Inches.	Feet.	Diff.	Inches.	Feet.	Diff.
11·0	1396·9	236·4	16·0	11186·3	162·8	21·0	18291·0	124·1	26·0	23871·0	100·3
11·1	1633·3	234·3	16·1	11349·1	161·8	21·1	18415·1	123·6	26·1	23971·3	99·9
11·2	1867·6	232·3	16·2	11510·9	160·8	21·2	18538·7	122·9	26·2	24071·2	99·5
11·3	2099·9	230·2	16·3	11671·7	159·8	21·3	18661·6	122·4	26·3	24170·7	99·1
11·4	2330·1	228·2	16·4	11831·5	158·8	21·4	18784·0	121·8	26·4	24269·8	98·8
11·5	2558·3	226·2	16·5	11990·3	157·9	21·5	18905·8	121·2	26·5	24368·6	98·4
11·6	2784·5	224·2	16·6	12148·2	156·9	21·6	19027·0	120·7	26·6	24467·0	98·1
11·7	3008·7	222·4	16·7	12305·1	155·9	21·7	19147·7	120·1	26·7	24565·1	97·6
11·8	3231·1	220·5	16·8	12461·0	155·1	21·8	19267·8	119·6	26·8	24662·7	97·3
11·9	3451·6	218·6	16·9	12616·1	154·1	21·9	19387·4	119·0	26·9	24760·0	97·0
12·0	3670·2	216·8	17·0	12770·2	153·3	22·0	19506·4	118·5	27·0	24857·0	96·6
12·1	3887·0	215·0	17·1	12923·5	152·3	22·1	19624·9	118·0	27·1	24953·6	96·2
12·2	4102·0	213·3	17·2	13075·8	151·5	22·2	19742·9	117·4	27·2	25049·8	95·9
12·3	5315·3	211·6	17·3	13227·3	150·6	22·3	19860·3	116·9	27·3	25145·7	95·5
12·4	4526·9	209·8	17·4	13377·9	149·7	22·4	19977·2	116·4	27·4	25241·2	95·2
12·5	4736·7	208·2	17·5	13527·6	148·9	22·5	20093·6	115·8	27·5	25536·4	94·9
12·6	4944·9	206·5	17·6	13676·5	148·0	22·6	20209·4	115·4	27·6	25431·2	94·5
12·7	5151·4	205·0	17·7	13824·5	147·2	22·7	20324·8	114·8	27·7	25525·7	94·2
12·8	5356·4	203·3	17·8	13971·7	146·3	22·8	20439·6	114·4	27·8	25619·9	93·8
12·9	5559·7	201·7	17·9	14118·0	145·6	22·9	20554·0	113·9	27·9	25713·7	93·4
13·0	5761·4	200·2	18·0	14263·6	144·7	23·0	20667·8	113·3	28·0	25807·1	93·2
13·1	5961·6	198·7	18·1	14408·3	144·0	23·1	20781·1	112·9	28·1	25900·3	92·9
13·2	6160·3	197·2	18·2	14552·3	143·1	23·2	20894·0	112·4	28·2	25993·1	92·5
13·3	6357·5	195·7	18·3	14695·4	142·4	23·3	21006·4	111·9	28·3	26085·6	92·1
13·4	6553·2	194·3	18·4	14837·8	141·6	23·4	21118·3	111·4	28·4	26177·7	91·9
13·5	6747·5	192·8	18·5	14979·4	140·9	23·5	21229·7	110·9	28·5	26269·6	91·5
13·6	6940·3	191·4	18·6	15120·3	140·0	23·6	21340·6	110·5	28·6	26361·1	91·2
13·7	7131·7	190·0	18·7	15260·3	139·4	23·7	21451·1	110·0	28·7	26452·3	90·9
13·8	7321·7	188·6	18·8	15399·7	138·6	23·8	21561·1	109·5	28·8	26543·2	90·5
13·9	7510·3	187·3	18·9	15538·3	137·9	23·9	21670·6	109·1	28·9	26633·7	90·3
14·0	7697·6	186·0	19·0	15676·2	137·1	24·0	21779·7	108·7	29·0	26724·0	89·9
14·1	7883·6	184·6	19·1	15813·3	136·5	24·1	21888·4	108·2	29·1	26813·9	89·6
14·2	8068·2	183·3	19·2	15949·8	135·7	24·2	21996·6	107·7	29·2	26903·5	89·3
14·3	8251·5	182·1	19·3	16085·5	135·0	24·3	22104·3	107·3	29·3	26992·8	89·1
14·4	8433·6	180·8	19·4	16220·5	134·3	24·4	22211·6	106·8	29·4	27081·9	88·7
14·5	8614·4	179·6	19·5	16354·8	133·7	24·5	22318·4	106·4	29·5	27170·6	88·4
14·6	8794·0	178·3	19·6	16488·5	132·9	24·6	22424·8	106·0	29·6	27259·0	88·1
14·7	8972·3	177·2	19·7	16621·4	132·3	24·7	22530·8	105·6	29·7	27347·1	87·9
14·8	9149·5	176·0	19·8	16753·7	131·6	24·8	22636·4	105·1	29·8	27434·9	87·6
14·9	9325·5	174·8	19·9	16885·3	131·0	24·9	22741·5	104·8	29·9	27522·5	87·2
15·0	9500·3	173·5	20·0	17016·3	130·3	25·0	22846·3	104·3	30·0	27609·7	86·9
15·1	9673·8	172·4	20·1	17146·6	129·7	25·1	22950·6	103·8	30·1	27696·6	86·7
15·2	9846·2	171·3	20·2	17276·3	129·0	25·2	23054·4	103·5	30·2	27783·3	86·4
15·3	10017·5	170·2	20·3	17405·3	128·4	25·3	23157·9	103·1	30·3	27869·7	86·0
15·4	10187·7	169·1	20·4	17533·7	127·7	25·4	23261·0	102·6	30·4	27955·7	85·8
15·5	10356·8	168·0	20·5	17661·4	127·2	25·5	23363·6	102·3	30·5	28041·5	85·6
15·6	10524·8	167·0	20·6	17788·6	126·5	25·6	23465·9	101·8	30·6	28127·1	85·2
15·7	10691·8	165·9	20·7	17915·1	125·9	25·7	23567·7	101·5	30·7	28212·3	85·0
15·8	10857·7	164·8	20·8	18041·0	125·3	25·8	23669·2	101·1	30·8	28297·3	84·7
15·9	11022·5	163·8	20·9	18166·3	124·7	25·9	23770·3	100·7	30·9	28382·0	84·4
16·0	11186·3		21·0	18291·0		26·0	23871·0		31·0	28466·4	

PART II.

Correction due to T—T', or the Difference of the Temperatures of the Barometers at the two Stations.

This Correction is Negative when the Temperature at the Upper Station is lowest, and vice versâ.

T—T'.	Correction.	T—T'.	Correction.	T—T'.	Correction.	T—T'.	Correction.	T—T'.	Correction.	T—T'.	Correction.
Fah't.	Feet.	Fah't.	Feet.	Fah't.	Feet.	Fah't.	Feet.	Fah't.	Feet.	Fah't.	Feet.
° 1	2·3	° 14	32·8	° 27	63·2	° 40	93·6	° 53	124·1	° 66	154·5
2	4·7	15	35·1	28	65·5	41	96·0	54	126·4	67	156·8
3	7·0	16	37·5	29	67·9	42	98·3	55	128·7	68	159·2
4	9·4	17	39·8	30	70·2	43	100·7	56	131·1	69	161·5
5	11·7	18	42·1	31	72·6	44	103·0	57	133·4	70	163·9
6	14·0	19	44·5	32	74·9	45	105·3	58	135·8	71	166·2
7	16·4	20	46·8	33	77·3	46	107·7	59	138·1	72	168·6
8	18·7	21	49·2	34	79·6	47	110·0	60	140·4	73	170·9
9	21·1	22	51·5	35	81·9	48	112·4	61	142·8	74	173·3
10	23·4	23	53·8	36	84·3	49	114·7	62	145·1	75	175·6
11	25·8	24	56·2	37	86·6	50	117·0	63	147·5	76	177·9
12	28·1	25	58·5	38	89·0	51	119·4	64	149·8	77	180·3
13	30·4	26	60·9	39	91·3	52	121·7	65	152·2	78	182·6

PART III.

Correction due to the Change of Gravity from the Latitude of 45° to the Latitude of the Place of Observation.

Positive from Lat. 0° to 45°; Negative from Lat. 45° to 90°.

App. Alt.	Latitude. 0° / 90°	10° / 80°	20° / 70°	30° / 60°	40° / 50°	45°
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
1000	2·6	2·5	2·0	1·3	0·5	0
2000	5·3	5·0	4·1	2·6	0·9	0
3000	7·9	7·5	6·1	4·0	1·4	0
4000	10·6	10·0	8·1	5·3	1·8	0
5000	13·2	12·4	10·1	6·6	2·3	0
6000	15·9	14·9	12·2	7·9	2·8	0
7000	18·5	17·4	14·2	9·3	3·2	0
8000	21·2	19·9	16·2	10·6	3·7	0
9000	23·8	22·4	18·3	11·9	4·1	0
10000	26·5	24·9	20·3	13·2	4·6	0
11000	29·1	27·4	22·3	14·6	5·1	0
12000	31·8	29·9	24·4	15·9	5·5	0
13000	34·4	32·4	26·4	17·2	6·0	0
14000	37·1	34·9	28·4	18·5	6·4	0
15000	39·7	37·3	30·4	19·9	6·9	0
16000	42·4	39·8	32·5	21·2	7·4	0
17000	45·0	42·3	34·5	22·5	7·8	0
18000	47·7	44·8	36·5	23·8	8·3	0
19000	50·3	47·3	38·6	25·2	8·7	0
20000	53·0	49·8	40·6	26·5	9·2	0
21000	55·6	52·3	42·6	27·8	9·7	0
22000	58·3	54·8	44·7	29·1	10·1	0
23000	60·9	57·3	46·7	30·5	10·6	0
24000	63·6	59·8	48·7	31·8	11·0	0
25000	66·2	62·2	50·7	33·1	11·5	0

PART IV.

Correction for Decrease of Gravity on a Vertical.

Always Positive.

App. Alt.
Feet.
2·5
5·2
7·9
10·8
13·7
16·7
19·9
23·1
26·4
29·8
33·3
36·9
40·6
44·4
48·3
52·3
56·4
60·5
64·8
69·2
73·6
78·2
82·9
87·6
92·5

PART V.

Correction due to the Height of the Lower Station.

Always Positive.

App. Alt.	Height of Barometer at Lower Station. 16 in.	18 in.	20 in.	22 in.	24 in.	26 in.	28 in.
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
1000	1·6	1·3	1·0	0·8	0·6	0·4	0·2
2000	3·1	2·5	2·0	1·5	1·1	0·7	0·3
3000	4·7	3·8	3·0	2·3	1·7	1·1	0·5
4000	6·3	5·1	4·0	3·1	2·2	1·4	0·7
5000	7·8	6·4	5·0	3·8	2·8	1·8	0·8
6000	9·4	7·6	6·0	4.6	3·3	2·1	1·0
7000	11·0	8·9	7·1	5·4	3·9	2·5	1·2
8000	12·5	10·2	8·1	6·2	4·4	2·8	1·3
9000	14·1	11·4	9·1	6·9	5·0	3·2	1·5
10000	15·7	12·7	10·1	7·7	5·5	3·5	1·7
11000	17·2	14·0	11·1	8·5	6·1	3·9	1·8
12000	18·8	15·3	12·1	9·2	6·6	4·2	2·0
13000	20·4	16·5	13·1	10·0	7·2	4·6	2·2
14000	21·9	17·8	14·1	10·8	7·7	4·9	2·3
15000	23·5	19·1	15·1	11·5	8·3	5·3	2·5
16000	25·1	20·3	16·1	12·3	8·8	5·6	2·7
17000	26·6	21·6	17·1	13·1	9·4	6·0	2·8
18000	28·2	22·9	18·1	13·8	9·9	6·3	3·0
19000	29·8	24·1	19·2	14·6	10·5	6·7	3·2
20000	31·3	25·4	20·2	15·4	11·0	7·0	3·3
21000	32·9	26·7	21·2	16·1	11·6	7·4	3·5
22000	34·5	28·0	22·2	16·9	12·1	7·7	3·7
23000	36·0	29·2	23·2	17·7	12·7	8·1	3·8
24000	37·6	30·5	24·2	18·5	13·2	8·4	4·0
25000	39·1	31·8	25·2	19·2	13·8	8·8	4·1

On Observations with Theodolites or Altazimuth Instruments. By Colonel J. T. Walker, R.E., F.R.S., Superintendent of the Great Trigonometrical Survey of India.

In the opening pages of these Hints, lists of instruments have been given which travellers of little experience are recommended to provide themselves with, and the sextant has been more particularly recommended, as the traveller will have opportunities of practising with it under the tuition of the officers of the ship which is conveying him to his destination. The suitability of this instrument for observations, both on land and sea, is thus a great advantage for any person who has not had an opportunity of learning the use of his instruments before starting on his expedition; and should he not have a sufficient knowledge of the methods of reducing the observations and calculating the results, he will find the simplest and easiest rules for his guidance in the several works on navigation, which are specially written for the reduction of observations with sextants by persons possessing little or no knowledge of the principles on which the rules are based. The inexperienced traveller can scarcely be expected to attain much accuracy in his observations and reductions, but should he explore unknown regions, he may be able to acquire valuable information, the immediate interest of which may be very considerable; but his work will necessarily be of a preliminary nature, and be liable to be largely corrected, or altogether superseded, by the operations of subsequent explorers.

But the extent of the regions of *terra incognita* in which inexperienced travellers can operate with the greatest advantage is constantly becoming more and more narrowed and diminished, and geographical science now-a-days frequently requires that the rough outlines which have hitherto sufficed for her purposes should not only be amplified and filled in, but rectified by more exact and reliable observations. The traveller must, in such cases, be provided with an instrument of greater capabilities than the sextant, and he should have thoroughly learnt the use of this instrument and the method of reducing the several kinds of observations which may be made with it before he commences operations. If he has no better instruments nor greater skill than his predecessors, his results may differ widely from theirs, but they will not be more worthy of confidence, and, while causing much perplexity and inconvenience to geographers, they will only exhibit with certainty the degree of uncertainty that is still attached to the problem under investigation.

An altazimuth instrument—or a theodolite possessing a complete vertical circle as well as a horizontal circle—is in many respects superior to a sextant. 1st, it measures horizontal angles directly, thus avoiding the labour of reducing oblique angles to the horizon; and a round of several angles can be measured with far less trouble than with the sextant. 2ndly, it measures small vertical angles of elevation or depression of objects which frequently could not be seen by reflection from a mercurial horizon for the measurement of the double angle by a sextant. 3rdly, its telescopic power is usually far higher than that of a sextant. 4thly, it may be so manipulated as to eliminate the effects—without in the first instance ascertaining the magnitudes—of certain constant instrumental errors, such as excentricity, collimation, and index errors. And 5thly, the influence of graduation errors may—when great accuracy is required—be reduced to a very considerable extent by systematic changes of the zero settings of the horizontal circle.

The disadvantages of the altazimuth instrument as compared with the sextant are its greater cost and bulk and weight; but in many instances these disadvantages will be more than counterbalanced by its superior capabilities.

Messrs. Troughton and Simms have favoured me with the following details regarding the cost, weight, and telescopic powers of these instruments as constructed by themselves:—

Instrument.	Weight of with Box.	Weight of Stand.	Price.	Telescopic Powers.	Readings of Verniers.	Details.
	lbs.	lbs.	£ s. d.			
7-inch (radius) sextant	7		12 0 0	5 to 10	10″	*
Artificial horizon ..	5 to 10					
4-inch (diameter) transit theodolite	13½	9	23 0 0	9 „ 12	1′	Without transit axis level, and lamp.
5-inch „ „ ..	25	10	32 10 0	12 „ 15	30″	With transit axis level, and lamp.
6-inch „ „ ..	31	12	40 0 0	12 „ 18	20″	Do.

* The weight of a tripod stand, as described in "Outfit" (p. 8), would be additional.

The Messrs. Casella construct certain very light and cheap altazimuth instruments, with 3-inch circles, power 5, weight with box 4 lbs., weight of stand 3½ lbs. divided to 1′, price under 20*l*.

For astronomical observations the sextant is decidedly preferable to very small altazimuth instruments, but the latter are to be preferred for the measurement of horizontal angles and small elevations or depressions.

The traveller must necessarily adapt his equipment to his requirements and the facilities he will possess for carrying his instruments about. He may find it convenient to employ

a sextant for astronomical, and a very small light altazimuth for terrestrial observations. But, whenever practicable, an altazimuth of moderate size, which may be used as a universal instrument, would undoubtedly be the most convenient and satisfactory.

The instrument which I would recommend for geographical explorations, as being well adapted for astronomical and for terrestrial observations, and not very bulky, is the 6-inch transit theodolite by Messrs. Troughton and Simms: several of these have been used in explorations connected with the operations of the Great Trigonometrical Survey of India, and have given great satisfaction, being sufficiently accurate for all desirable purposes, and not too heavy to be easily carried. These instruments are adapted for determinations of time and longitude by the method of zenith distances, and also by that of meridional transits; the former being best suited for the traveller when he can only devote a few hours to the operations, the latter when he is halting for a long time at one place: the two methods lead to strictly independent results, so that when both are employed they serve to check each other. The instrument is also well suited for latitude and azimuth observations; in fact it can be employed in any of the investigations which an explorer may have to undertake by means of astronomical observations. On the other hand, as an instrument for the measurement of terrestrial angles, whether horizontal or vertical, it is very valuable, and far superior to any sextant, not only being more conveniently manipulated, but possessing telescopic powers which permit of the detection and identification of objects that would often be sought for in vain with a sextant.

Trigonometrical operations are, as a rule, far simpler and more easily reduced, and lead to more accurate results than astronomical observations. A continuous triangulation, or a traverse with measured angles and distances, is necessarily impossible when the explorer has to pass through a country very rapidly; but he may frequently remain for several days at one place, and may then have opportunities of greatly extending the scope of his operations by executing a triangulation. Suppose him to be in view of a range of hills which he may not have an opportunity of exploring, distant say 50 to 100 miles; he may have already endeavoured on his line of march to fix points on the range by bearings, but from the absence of prominent landmarks has found a difficulty in identifying the points observed, and thinks he may have mistaken one hill for another in consequence of their changes in appearance as viewed from positions at some distance apart. If, during his

few days' halt, he can manage to do a little triangulation, he may fix the general outlines of the entire range relatively to his halting-place with very respectable accuracy. He has first to measure a base and determine by triangulation the positions of three stations lying in a direction nearly parallel to that of the range, and at distances of 2 to 5 miles apart; then at each of these stations he must measure the angles between the other stations and a series of points on the entire length of the range;* though no very prominent landmarks may be visible, still the telescope will show a number of objects—trees, masses of rock, and peculiarities of the ground—sufficiently clearly to permit of their being recognized at stations of observation which are so close to each other; and though the triangles will be very acute-angled, the angles may easily be measured with sufficient accuracy to give the distances of the points on the ranges from the stations of observation with a small percentage of error, whenever the marks are fairly identified; and as there will be two triangles to each point, and, therefore, double values of the side common to both triangles, any mistakes—whether of identity, or of reading, or calculation—will be at once shown up.

The 6-inch transit theodolites of the Indian Survey which have been used in military expeditions and explorations are specially provided with a pair of micrometers in the eyepiece of the telescope, for the purpose of measuring small angles, and more particularly those subtended by objects of known dimensions, by means of which the distance between the object and the observer is readily deduced. The system of micrometers is moveable through an angle of 90°, so as to permit of the measurement of either a horizontal or a vertical object. With the aid of this appliance, the instrument can be employed in carrying on a traverse without using any direct measuring apparatus, such as a chain or perambulator, the distances to the

* He should make a sketch of the outline of the range in his book of observations; and as he will probably be unable to ascertain the names of the hill summits at such a distance from them, and many of them may have no names, he had better number them in the order in which they are observed, and refer to them always by these numbers, until he can confidently replace a number by a name. Exaggerated sketches of the outlines of the objects intersected by the telescope are frequently of use to facilitate identification on proceeding to the next station.

The positions of places situated within or beyond the range of hills, which are invisible to the traveller, but are known to his native guides and assistants, may frequently be determined by making a native point the theodolite, as a gun, in the direction of the place, and state its distance beyond or on this side of the range. The guides will often be found to possess a remarkable knowledge of locality, and I have frequently known the independent pointings of different men towards distant invisible objects to coincide together very closely, as was shown by the readings of the azimuthal circle.

back and forward stations being determined by measuring the angles subtended by poles of known length, which are set up at the stations. In hilly and broken ground, in crossing rivers or other obstacles, and generally wherever a direct measurement is impracticable, this method of procedure is most convenient. It was adopted by Captain Carter, R.E., in his survey—with one of these instruments—of the line of country passed over by the British army in the Abyssinian expedition. Captain Carter carried a traverse from Adigerat to Magdala, a distance of nearly 300 miles, without any break of continuity, the daily rate of progress averaging 5 miles, and being occasionally as much as 8 miles. The difference of latitude between the origin and terminus as determined from these operations only differed by about a quarter of a mile from the value determined astronomically.

Whenever a halt occurred in the movements of the army, the instrument was used as a theodolite in triangulating to fix the positions of all hills and other prominent objects around the halting-place; it was also used for various astronomical observations.*

Remarks on the Manipulation of Altazimuth Instruments.

Observations with these instruments should always be made in pairs, with the face of the vertical circle alternately to the right and left of the observer. Thus, supposing that in the first observation, or round of observations, the face of that circle is to the right of the observer, the telescope should be immediately afterwards moved through 180° in azimuth, and turned over in altitude, which will bring the face of the circle to the left of the observer, and then a second observation, or round of observations, should be taken; the mean of the two measures, face right and face left, will be free from collimation, index, and other instrumental errors.

In measuring horizontal angles between objects of nearly the same altitude, as landmarks not much above or below the

* These instruments being furnished with a pair of micrometers, which can be used either horizontally or vertically, are all the more valuable for astronomical observations; for the micrometers give two additional wires over which the stars may be observed, and these wires can be set at pleasure to any distance from the fixed wires in the diaphragm which may be best suited to the rate of movement of the star. For pairs of observations—face right and face left—no reductions to the centre wire are necessary; and thus greater accuracy is obtained with very slight additional trouble of observing, and still less of computing.

horizon, a change of face is not absolutely necessary, and may be dispensed with if the observer is hurried; but when such angles are measured between objects of very different altitudes —as a terrestrial referring mark and a star—and whenever altitudes are measured, whether of terrestrial or celestial objects, the observations should invariably be taken in both positions, alternately "face right" and "face left," and the final result deduced from the mean, in order that the instrumental errors may be eliminated. There is no necessity to determine the magnitude of these errors, as in the sextant; in an instrument which has to travel far over bad ground the adjustments are liable to alter from time to time, but they are not likely to alter in the interval between two consecutive observations, and the errors arising therefrom will be eliminated in the mean of the pair.

In what follows regarding *astronomical* observations with these instruments, a complete observation will be understood to imply the mean of a pair of observations, one with face right, the other with face left, taken continuously without any considerable pause between them, the entire operation being considered as one observation.

Determinations of Time, Azimuth, Latitude and Longitude, with a Transit Theodolite.

The transit theodolite may be employed either as a transit instrument or as an altazimuthal instrument; it is adapted for all astronomical observations, excepting those of "lunar distances," which can only be performed by a sextant or a reflecting circle, and occultations, which require larger telescopes.

Thus a description of each of the various kinds of observations which can be made with transit and altazimuth instruments, with full details of the methods to be employed in the corresponding reductions, would fill a volume, and be much more than is required for a book which merely purports to give hints to travellers. Those who wish to learn full particulars of each of the several methods of observation, and of the reductions, cannot do better than study Chauvenet's 'Spherical and Practical Astronomy,' which is one of the most valuable works on the subject in the English language: it gives ample instructions for observations of all kinds, the rudest and most hurried, as well as the most refined and elaborate, and it supplies corresponding formulæ—approximate as well as rigorous—for the reduction of the observations.

As these Hints are merely intended to indicate the simplest and most expeditious methods by which a traveller who is able to carry a suitable altazimuthal instrument about with him can take the astronomical observations which are essentially necessary for his geographical explorations, they will be restricted to determinations of time, latitude and longitude, by the measurement of zenith distances, and of azimuths by horizontal angles; formulæ—some approximate but all sufficiently rigorous for the purpose, and adapted mostly from Chauvenet—will also be given, for the reduction of the observations.

Latitude Observations, the time being unknown.—The instrument being duly levelled and brought approximately into the meridian, set the telescope on any star—or on the sun—when approaching culmination, and follow it until the maximum altitude is reached; take the zenith-distance reading on the vertical circle, change face quickly, and make a second observation; the mean of the two will be a "complete observation" of zenith distance. Two or three pairs of observations may be taken to circumpolar stars, as their zenith distances will not alter sensibly during an interval of a quarter to half an hour; for other stars the observations should be restricted to one pair, and stars should not be observed when within 25° of the zenith. A single pair of observations with the 6″ transit theodolite should give a determination within 20″ of the truth; greater accuracy may be obtained by observing additional stars, more particularly when the stars are selected so as to form pairs of nearly equal distance from the zenith, north and south.

Latitude Observations, the time being known.—(1.) Observe the zenith distance of the Pole-star in any position, and reduce to the meridian by the tables in the 'Nautical Almanac.'

(2.) Take circum-meridian observations of the zenith distance of any star, alternately face right and face left, and note the time of each observation; compute the reduction of the zenith distance at the time of observation to the distance on the meridian, and take the mean of the reduced results as the determination of the meridional zenith distance. Three or four pairs of observations may generally be made in succession to the same star; but the nearer the star is to the zenith the more accurately should the times be known—it is not desirable, therefore, to observe stars within 10° of the zenith. Here, too, pairs of north and south stars of nearly equal zenith distance will give the best results.

Time.—Take pairs of observations of the zenith distance of a star, noting the chronometer time of each, and adopt the mean of the times as the time corresponding to the mean zenith distance, with which, the latitude of the place, and the star's declination, the star's hour angle must be computed by either of the well-known formulæ: thus the local time and the chronometer error will be determined. For these observations stars are most favourably situated which are easterly or westerly, and not very near either to the horizon or to the meridian; and greatest accuracy is obtained when two stars are observed at nearly the same altitude, one to the east, the other to the west. With a pair of observations the chronometer error should be determined within 1 second when a 6″ transit theodolite * is used.

* At a trial of one of these instruments for the Indian Survey, the results of six pairs of observations on east and west stars fell within an extreme range of 0·4 of a second of time; the stars were, however, observed on the wires of the two micrometers, as well as on the fixed wire of the diaphragm. (*See* footnote, page 36.

Longitude.—Take pairs of observations of zenith distance on a star for the determination of the local time and chronometer error, then take other pairs of observations of zenith distance on the moon; in each instance adopt the mean of the chronometer times as that of the "complete observation" of zenith distance. Both moon and star should be easterly or westerly, and not very near either to the meridian or to the horizon. The operations should commence and close with star observations, in order that the chronometer rate may be duly ascertained and allowed for. Ten pairs of observations to the moon and six to stars ought not to occupy more than four hours, and they should give a very fair result, probably within 8 miles of the truth. The effect of instrumental errors will be materially reduced when the stars and the moon are on the same sides of the meridian and at nearly the same zenith distance; if time permits, observations should be taken both east and west of the meridian, and both before and after full moon.

Azimuth, time and latitude being unknown.—Observe the angles between a referring mark * and a star when the star is at the same altitude east and west of the meridian; several pairs of observations may be taken at consecutive altitudes, half with face right and half with face left. Or the angles may be measured between a referring mark and a circumpolar star at the times of its maximum elongations east and west. The mean of the two angles at opposite positions gives the angle between the star and the meridian, and thence the azimuth of the referring mark, without any calculations whatever. In the first case, however, an interval of several hours must be allowed to elapse between the observations east and west; and as twelve hours must necessarily elapse between the opposite elongations of a circumpolar star, few stars will ordinarily be visible at both elongations.

It may therefore be desirable to adopt a third and more expeditious method, as follows:—Measure the angles between the referring mark and *two* circumpolar stars at their respective elongations, selecting stars which are nearly in opposition or nearly in conjunction, and will attain their maximum elongations at nearly the same time, that the observations may be completed quickly; then with the observed value of the angle between the stars, and the given declinations of the stars, the azimuths of both may be readily computed, as shown at page 18.

Azimuths, latitude being known.—Observe the angle between the referring mark and a circumpolar star at maximum elongation, and compute the azimuth of the star. To stars near the pole two or three pairs of observations, face left and face right, may be taken before the star moves sensibly from the position of maximum elongation.

Azimuth, latitude and time being known.—Any star may be observed in any position, but the best results will be obtained when a circumpolar star is observed at a short distance from the elongation; the angle between the position of the star at the observation and at the elongation may be computed by the formulæ at page 18.

General Remarks.—The observed zenith distances should always be corrected for refraction; barometer and thermometer readings should, therefore,

* A good referring mark may be made of a cross with a hole of ¼ to ½ an inch in diameter in the centre, to which observations can be taken by day and by night, being rendered visible at night by a bull's-eye lantern placed behind the hole and directed to the observer. The stem of the cross should be vertical, and driven firmly into the ground. The distance from the station of observation should be at least half a mile, and the station should be marked by a pin driven into the ground, over which the theodolite must be carefully centered whenever set up for horizontal observations.

be taken during the observations, for the better determination of the refraction. When no barometer is at hand, the height of the station of observation should be given, as deduced by the boiling point or otherwise, or even approximately estimated. It may be well to remember that in determining latitude errors of refraction may be eliminated by observing pairs of north and south stars of the same zenith distance.

Formulæ and Examples.

Latitude by Circum-meridian Observations of a Star.

Let ϕ be the true latitude, ζ the true zenith distance on the meridian, ζ_0 the observed zenith distance corrected for refraction, δ the declination of the star,* ϕ_0 an approximate value of ϕ, $= \delta \pm \zeta_0$, t the hour angle of the star.

$$\text{Put } A = \frac{\cos\phi_0 \cos\delta}{\sin\zeta_0} \text{ and } m = \frac{2}{\sin 1''} \sin^2 \tfrac{1}{2} t.$$

$$\text{Then } \zeta = \zeta_0 - Am, \text{ and } \phi = \delta \pm \zeta.$$

The values of m are tabulated in Chauvenet's 'Astronomy.'

Alternative forms of m, adapted for various logarithmic tables.

m = cosec 1″ versin t.
$= \cdot 00055t^2$, when t is given in seconds of time.
$= 2t^2$ nearly, „ „ minutes „

Supposing n observations to be taken, then, since A is constant,

$$\zeta = \zeta_0 - A\frac{m_1 + m_2 + \ldots + m_n}{n}.$$

Example.—Circum-meridian Observations for Latitude to β Ursæ Minoris, North of the Zenith.

Face.	Circle Readings.†	Mean Zenith Distances of Pairs of Observations.	Chronometer.	t in Minutes of Time.	t^2.	Data.
		° ′ ″	H. M. S.			H. M. S.
Left	Alt. 64 10 20	35 47 38	14 45 47	7·2	52	☆ of Star .. 14 51 14
Right	Z. D. 35 45 35		47 1	6·0	36	Chron. Error + 1 46
„	„ 35 45 0	35 47 5	48 55	4·1	17	Chron. Time of Transit 14 53 0
Left	Alt. 64 10 50		51 30	1·5	2	
„	„ 64 11 0	35 47 8	54 37	1·6	3	
Right	Z. D. 35 45 15		56 22	3·4	12	δ .. .. = 74 46 37
„	„ 35 45 30	35 47 25	57 43	4·7	22	ζ_0 .. .. = 35 48 5
Left	Alt. 64 10 40		58 48	5·6	34	
„	„ 64 10 30	35 47 40	15 0 18	7·3	53	ϕ_0 .. .. = 38 58 32
Right	Z. D. 35 45 50		2 10	9·2	85	
	Mean	35 47 23		Mean ..	31·6	log cos ϕ_0 .. 9·8906
	Refraction ..	+ 42				log cos δ .. 9·4192
	ζ_0 =	35 48 5		31·6 × 2 = 63·2.		log cosec ζ_0 .. 0·2330
	− Am =	− 22				log A .. .. .. 9·5429
	ζ =	35 47 43	ϕ = 38° 58′ 54″.			log 63·2 .. .. 1·8007
						log Am .. .. 1·3436

For the above formula t should be less than 20 minutes, and ζ greater than 10°.

* When the sun is observed the declination corresponding to the mean of the times of observation should be used.

† The circle readings will be alternately altitudes and zenith distances ± the index error of the instrument, which error is eliminated in the mean of a pair of observations.

Longitude by Lunar Zenith Distances.

The local time and the chronometer error having been determined from the star observations

Let ζ_0 = the observed zenith distance of the moon's limb.
Θ = the local sidereal time of the observation of ζ_0.
L_1 = an assumed value of the longitude.
ΔL_1 = the required correction of L_1.
L = the true longitude = $L_1 + \Delta L_1$.
ϕ = the latitude.

Find the Greenwich time corresponding to Θ and L_1, for which take

δ = the moon's declination.
π = the moon's equatorial horizontal parallax.
S = the moon's geocentric semi-diameter.
} from the 'Naut. Alm.'

Let S_1 be the moon's apparent semi-diameter, and π_1 the corrected parallax;

$$\text{then } S_1 = S + \Delta S, \text{ and } \pi_1 = \pi + \Delta\pi;$$

and the values of ΔS and $\Delta\pi$ may be interpolated from the tables below, which are abridged from Chauvenet.

Also put $\delta_1 = \delta + e^2 \pi_1 \sin\phi \cos\delta$, in which $\log e^2 = 7{\cdot}8244$; and let r be the refraction for the apparent zen. dis. ζ_0;

$$\text{and let } \zeta_2 = \zeta_0 + r \pm S_1,$$
$$\text{and } \zeta_1 = \zeta_2 - \pi_1 \sin\zeta_2;$$

then the hour angle, t, is found from the equation

$$\sin^2 \tfrac{1}{2}t = \frac{\sin \tfrac{1}{2}[\zeta_1 + (\phi - \delta_1)] \sin \tfrac{1}{2}[\zeta_1 - (\phi - \delta_1)]}{\cos\phi \cos\delta_1},$$

after which the moon's right ascension, $\mathcal{R}$, is found by the formula

$$\mathcal{R} = \Theta - t.$$

The Greenwich mean time corresponding to the moon's $\mathcal{R}$ must be found from the 'Nautical Almanac'; with this and the local mean time a value of the longitude is determined, which, however, is approximate only, as t is computed with an approximate value of δ depending on the assumed longitude. Put L_2 for the approximate value of the longitude which is thus determined, and

Values of Δ S, always +.							Values of $\Delta\pi$, always +.			
Apparent Zen. Dis. of Moon.	Horizontal Semi-diameter.						Latitude.	Equatorial Parallax.		
	14′ 30″	15′ 0″	15′ 30″	16′ 0″	16′ 30″	17′ 0″		53′	57′	61′
°	″	″	″	″	″	″	°	″	″	″
0	13·7	14·6	15·6	16·7	17·7	18·8	0	0·0	0·0	0·0
10	13·5	14·4	15·4	16·4	17·5	18·6	10	0·3	0·3	0·4
20	12·9	13·8	14·7	15·7	16·7	17·7	20	1·2	1·3	1·4
30	11·8	12·7	13·5	14·4	15·4	16·3	30	2·7	2·9	3·1
40	10·5	11·2	12·0	12·8	13·6	14·4	40	4·4	4·7	5·1
50	8·8	9·4	10·1	10·7	11·4	12·1	50	6·2	6·7	7·2
60	6·9	7·3	7·9	8·4	8·9	9·5	60	8·0	8·6	9·2
70	4·7	5·1	5·4	5·8	6·1	6·5	70	9·4	10·1	10·8
80	2·4	2·6	2·8	3·0	3·2	3·4	80	10·3	11·1	11·9
90	0·1	0·1	0·1	0·1	0·2	0·2	90	10·6	11·4	12·2

put β = the increase of δ in a unit of time } at the Greenwich mean time
and λ = „ R „ } of the observation of the moon;

$$\text{also let } a = \frac{\beta}{15\lambda}\left\{\frac{\tan\phi}{\sin t} - \frac{\tan\delta}{\tan t}\right\};$$

$$\text{then } \Delta L_1 = \frac{L_2 - L_1}{1+a}, \text{ and } L = L_1 + \Delta L_1.$$

These formulæ are demonstrated in Chauvenet, vol. i. pages 383 to 385; and when several observations have to be reduced, they entail less labour of computation than any other formula.

Example.—In latitude $\phi = 38° 58' 53''$ and assumed longitude $L_1 = 5$ h. 6 m. west of Greenwich, on May 2nd, 1849, the moon being east of the meridian, the zenith distance of the moon's upper limb was observed to be 57° 47′ 28·5″, when the local mean time was 5 h. 33 m. 21·6 s., and the local sidereal time Θ = 8 h. 16 m. 14·61 s.

Approximate Greenwich mean time,
10 h. 39 m. 21·6 s.

for which we find from the 'Naut. Alm.'

δ	= + 3°	47′	47·6″
S	=	15	16·4
π	=	56	3·1

and from the tables on page 22 we find

Δ S	=	+	8·1
$\Delta\pi$	=	+	4·4
$e^2\pi_1 \sin\phi / \cos\delta$	=	+	14·1

ζ_0	= 57°	47′	28″·5
r	= +	1	30·9
S_1	= +	15	24·5
ζ_2	= 58	4	23·9
$-\pi_1 \sin\zeta_2$	= −	47	38·1
ζ_1	= 57	16	45·8
δ_1	= 3	48	1·7

With these values of δ_1, ζ_1, and ϕ we find—

	H.	M.	s.
t = −	3	19	53·64;
but Θ =	8	16	14·61;
whence the computed R =	11	36	8·25.

	H.	M.	s.
The corresponding Greenwich mean time for this value of the R is	10	39	48·7
The local mean time is	5	33	21·6
Whence the approx. long. L_2 is	5	6	27·1

For the Greenwich mean time 10 h. 39 m. 48·7 s. { increase of R in 1 m. = 2·014 = λ.
„ δ „ = 10″·01 = β.

Whence a = − 0·3317; and since $L_2 - L_1$ = + 27·1 s.,

$$\Delta L_1 = 40\text{s}.6, \text{ and } L = 5\text{h}.\ 6\text{m}.\ 40\text{s}.6.$$

Formulæ for the reduction of Azimuth Observations.

(1.) When a star is observed at an elongation.
Let A be the azimuth, δ the declination, ϕ the latitude.

$$\text{Then } \sin A = \frac{\cos\delta}{\cos\phi}.$$

(2.) When a star is observed at a short distance from the elongation.
Let t be the hour angle at the time of elongation,

$$\text{then } \cos t = \frac{\tan \phi}{\tan \delta}.$$

Let dt be the difference between the hour angles at the times of elongation and of observation, and dA the corresponding difference of azimuth.

$$\text{then } \tan dA = -2 \sin^2 \frac{dt}{2} \sec \phi \cot \delta \operatorname{cosec} t;$$

whence if dt is expressed in *minutes of time*, and κ is a constant,

$$\log \kappa \text{ being } = \cdot 29303 + \log \sec \phi + \log \cot \delta + \log \operatorname{cosec} t,$$
$$dA'' = -\kappa (dt)^2.$$

(3.) When two stars are observed at their elongations.
Let their azimuths be A_1 and A_2, and their declinations δ_1 and δ_2,

$$\text{then } \sin A_1 = \frac{\cos \delta_1}{\cos \delta_2} \sin A_2.$$

The value of $A_1 + A_2$ or of $A_1 - A_2$ is given by the observations, $A_1 + A$ if the stars are at opposite elongations, $A_1 - A_2$ if they are at the same elongation. Suppose that we have

$$A_1 \pm A_2 = m,$$
$$\text{then } \cot A_1 = \cot m \pm \frac{\cos \delta_2}{\cos \delta_1} \operatorname{cosec} m,$$
$$\text{or } \cot A_2 = \cot m \pm \frac{\cos \delta_1}{\cos \delta_2} \operatorname{cosec} m.$$

Adjustments of the "Everest Theodolite, improved, by Grover." (Furnished by Captain Pratt, R.E.)

It is stated that this theodolite is likely to be adopted into the service of the Royal Engineers. It is therefore thought advisable to describe its adjustments. The instrument is made by Cooke and Sons, York.

1. *Correction for Parallax.*—Adjust the eyepiece to distinct vision of cross hairs, and correct for parallax by means of the object-glass screw.

2. *Making the Level of the Horizontal Limb parallel to that Limb.*—Clamp the tribrach* to axis, and unclamp the horizontal vernier-plate. Move the latter so that the horizontal limb's level may be over, or parallel to, two foot-screws. By means of these screws bring the bubble to the centre of level. Turn the vernier-plate round 180°, and correct the level's error half by

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* Modern instruments are set on a tribrach, or 3-armed support, at the top of the stand, instead of being screwed on to the top of it. This is a great improvement in many ways.

the foot-screws and half by the level's capstan-headed screws. Turn the vernier-plate back to its original position; and if the bubble is not now exactly in the centre, correct as before. Repeat the process till accuracy is obtained.

3. *Levelling the Instrument*, i. e., *making its vertical axis truly vertical.*—Clamp the tribrach to axis, and unclamp the horizontal vernier-plate. Level the horizontal limb's level by the foot-screws. Turn the horizontal vernier-plate round 90° and re-level. This will make the vertical axis approximately vertical. Then bring the bubble of the vertical limb's level to the centre of bulb by the two antagonising screws at bottom of vertical vernier-plate. Turn round 180°; and if the vertical limb's level is disturbed, correct half of the error by the foot-screws and half by the two antagonistic screws. Turn the horizontal plate 90°, and repeat the process till accuracy is obtained.

If the bubble of the level attached to the horizontal plate is now disturbed, bring it to centre of bulb by the capstan-headed screw, so as to make it an index of horizontality.

4. *Collimation.*

(a) *Vertical Collimation.*—Unclamp the vertical limb, and make its level horizontal by means of the antagonising screws. By means of the vertical limb's tangent-screw get the horizontal spider-line to cover some well-defined distant point. Read off the angle on the vertical verniers.

Reverse the instrument on its bearings, re-level, and re-intersect the same object. If now the vertical verniers read as at first, the vertical collimation is correct. If not, the mean of the readings is the true angular deviation from the horizontal. By means of the vertical limb's tangent-screw make the vertical verniers read this true deviation, and intersect the distant point by means of the antagonising screws.

This will disturb the level of the vertical limb. Restore its horizontality by means of the capstan-headed adjusting screws. The verniers should now read the same angle in both positions of the transit axis. If not, repeat the process till accuracy is obtained.

(b) *Horizontal Collimation.*—Intersect some well-defined distant point with the spider-lines. Reverse the instrument on its bearings. If there is any deviation from the intersection, correct half with the tangent-screw of the horizontal limb and half with the capstan-headed screws which move the diaphragm. Reverse the instrument on its bearings, and repeat similar corrections till accuracy is obtained.

Meteorological Instructions for the use of inexperienced Observers.

(Extracted chiefly from a Circular issued by the Meteorological Society.)

The chief object of an inexperienced meteorological observer should be to obtain data whence an accurate table may be compiled, of the following character:—

Place.				
Lat.		Long.	Elevn.	
	Mean temp.	Monthly range.	Rain, &c.	Periodical winds.
Jan.				
Feb.				
Mar.				
April				
May				
June				
July				
Aug.				
Sept.				
Oct.				
Nov.				
Dec.				
Year				
No. of years' observation				
Hours and mode of observation ..				

The original observations should be carefully preserved, in order to give evidence of the sufficiency of the data whence the printed results have been obtained, and to afford opportunity of investigating such anomalies, as may at any future time call for inquiry.

The following instructions show the minimum of effort with which trustworthy results can be obtained. They are especially intended for residents. Travellers on the march must act up to the spirit of them, as nearly as they can.

Observations on Heat.

1. *To Expose Thermometers.*—The instruments must be placed in a carefully selected position, or all their results will be vitiated. Choose an airy place, where there is continuous, dense, and ample shade. There set up a box of not less than 2 feet in height, width, and depth. It must be constructed precisely on

the principle of an ordinary meat-safe; that is to say, it must be roofed (and better still, double roofed) from the rain, and have perforated sides, whether of gauze, trellis-work, or Venetian blinds, through which the air may pass with perfect freedom. It must be fixed on a stand or be suspended 4 feet above the ground. The thermometers should be hung on supports placed in the middle of the box, except where otherwise mentioned in the 1st method, § 3.

2. *Monthly Mean Temperatures.*—The average of the daily means, taken by one of the methods described in the next paragraph during an entire month, gives the monthly mean. If occasionally a day or a month be dropped, a gap must be left in the record, and no attempt be made to fill it.

3. *Daily Mean Temperatures.*

1st Method: This is the more accurate, but requires observations to be made *twice* in each day.

Procure a jar or box, of not less than 8 inches in length, width, and depth; fill it with dry sand, and set it in a properly exposed box (§ 1). Place a thermometer upright in the middle of the sand, with its bulb buried from 3 to 4 inches below its surface. Note its readings twice a day, at intervals of twelve hours, say at 9 A.M. and 9 P.M.; the mean of these readings may be accepted as the daily mean.

2nd Method: By observations made *once* in each day.

Hang a maximum and a minimum thermometer on supports, as described in § 1, and note their readings once daily, either in the morning or in the afternoon, and readjust the indexes. The mean of the maximum and minimum usually differs from the mean temperature of the day by less than half a degree; but occasionally (as at Barnaul in Central Asia) the difference exceeds 1½°. The liability to a constant error of this amount is too serious to be passed over without investigation, especially as the approximate correction due to each month can be readily ascertained by making occasional use of the 1st method as a standard of comparison. When the year's work is completed, it will be easy to estimate the corrections due to the several months, and to apply them to the monthly means obtained by this 2nd method.

4. *Monthly Range* is the difference between the lowest and highest readings during the month.

5. *Yearly Means*, whether of *temperature* or of *range*, are the averages of the monthly means.

"The enclosure of a maximum and minimum self-registering thermometer in a large cask of dry sand, which might be opened and read off twice a year, would also probably afford a very accurate mean result."—*Sir John Herschel.*

Rain, Snow, and Dew.

6. These must be measured by a Gauge, which should be placed on the ground or on a low stand in an exposed situation. The relation of the units of length and weight is such that the tenth of an inch of rain falling into a vessel whose mouth is a circular area of about two inches and nine-tenths in diameter (1·4467 inch radius) will weigh an ounce (Troy). Every medicine-chest contains a fluid ounce (Troy) measure; and, failing this, it will suffice to mark the space occupied in a small vessel by 480 drops of water, whose weight is one fluid ounce. A properly made rain-gauge and graduated measure is, however, preferable to any makeshift.

Wind.

7. Practised observers rarely use a weathercock, but watch the way the clouds (when any) are drifting. These are far steadier in their course than anything driven by the surface-currents of wind. For the requirement of the tabular statement now desired, it will be sufficient to note the prevalence of periodical weather.

Photography.

Photography for Travellers and Tourists. By Dr. Pole, F.R.S.

[Reprinted, by permission, from 'Macmillan's Magazine' of 1862, and revised by the Author, 1871.]

Doubtless, the idea must often have occurred to almost every traveller, what an advantage it would be if he could himself take photographs, where he likes, of what he likes, when he likes, and how he likes. But such an idea must soon have been dismissed, from the supposed incompatibility of this with ordinary travelling arrangements. The usual notion of photographic operations comprehends a fearful array of dark rooms, huge instruments, chemical paraphernalia, water, and mess, which no sane person, out of the professional photographic guild, would think of burdening himself with on an ordinary journey, and which only a practised adept could use if he had them; and so the idea of a traveller's taking views for himself on his tour is generally dismissed at once as an impracticable chimera.

Now, it is the object of this article to show that such a view of the matter is a delusion, and that any traveller or tourist, gentleman, or lady, may, by about a quarter of an hour's learning, and with an amount of apparatus that would go into the gentleman's coat pocket, or the lady's reticule, put himself or herself into the desirable position we have named.

It is not our intention to write a treatise on photography; but we must state generally what the operations are, in order to make our explanations intelligible.

The process, then, of taking a photographic picture consists essentially of three main divisions, namely—1. Preparing the plate; 2. Taking the picture; and 3. Developing the image; and the most common and best known arrangement of these is as follows:—A glass plate of the proper size is coated with collodion, and made sensitive to light by dipping in a bath of a certain solution. It is then, *while it remains moist*, placed in the camera obscura, and exposed to the image formed by the lens; after which, *but still before the plate has had time to dry*, it is taken out, and treated with certain chemicals which have the property of developing the image so obtained. The plate is then what is called a "negative;" from which, after it has been secured by varnish, any number of impressions or "prints" may be taken at any time.

Now, it will be seen by the words we have printed in italics, that, according to this method of operation, the whole of the three parts of the process must be performed within a very short space of time; and, since the first and third require to be done in a place to which daylight cannot enter, a dark room, supplied with a somewhat extensive assortment of chemical apparatus, must be provided *close to the place* where the picture is taken. This method, from the necessity of the plate remaining moist, is called the *wet* process. It is always employed for portraits, and has the advantage not only of great beauty of finish, but of extreme sensitiveness, requiring only a few seconds' exposure in the camera.

The wet process was the first, and, we believe, for some time the only collodion process in use. But, in a happy moment, it occurred to somebody to inquire whether it was really indispensable that the plates should be kept *moist* during the whole operation; and it was found that, by certain modifications of the process of preparing them, they might be allowed to *dry*, and that some time might elapse between the preparation and the exposure, as well as between this and the development. The immense advantage this promised to landscape photography led to extensive investigation; and several processes have now been perfected which will secure this result. Plates may be prepared at any convenient time and place, and may be carried about for months, ready for use at a moment's notice; and, after the picture is taken, they may also be kept some time before development. The only price we pay for this advantage is the necessity for a little longer exposure in the camera; which, for landscapes, is of no moment at all.

The bearing of this discovery on our more immediate subject will be at once apparent, as it gets rid of the necessity of providing, on the journey, for the preparation and development, with all their cumbersome and troublesome apparatus, and limits what is necessary to the simple exposure, or taking of the picture. And another advantage of still more importance follows from this—namely, that the plates may be prepared and developed, not only in another place, but by another person. The knowledge, care, and skill required for photography, as well as the stains and all other disagreeables attending it, refer almost exclusively to the preparation and development; the exposure to take the view is an operation of the simplest kind, which anybody may learn in a few minutes, and which is attended with no trouble or inconvenience whatever.

Limiting, therefore, the traveller's operation to the taking of the picture, let us consider what this involves. The first question which affects materially the portability of the necessary apparatus, is the *size* of picture to be taken. We are accustomed to see very large and beautiful photographs of scenery and architecture; but these would be impracticable for the traveller, as the dimensions of the plate increase so materially every portion of the apparatus.

Differences of opinion and of taste may exist as to the degree of inconvenience it is worth while putting up with; but the writer of this paper, after considerable experience, has come to the conclusion that the smallest size in ordinary use—namely, the *stereoscopic* plate—is by far the most eligible one for travelling. The object is not to make large and valuable artistic pictures—that we must always leave to the professional man—but it is simply to preserve faithful representations; and this may be done as well on the small as on the large scale, and with infinitely less trouble. For, though the size is small, the delicacy of detail procurable with well-prepared plates, even in a large extent of view, is something marvellous, as may easily be seen in some of the magnificent stereoscopic views that are to be had in the shops; besides which, the stereoscopic effect gives an air of reality to the view which greatly enhances the value of the representation.

The camera for the double stereoscopic plate has been reduced, by ingenious contrivances, to a very portable size; but the writer has generally preferred to use a single plate of $3\frac{1}{4}$ by $2\frac{3}{4}$ inches, which is more handy and more easily manipulated. By taking two views of this size, and shifting the camera a few inches for the second one (for which purpose a simple contrivance may easily be introduced on the top of the stand), a stereoscopic picture will be obtained when prints from them are mounted side by side in the usual way. The camera for either the double or the single plate may be hung round the neck by a strap, and will be little inconvenience, while the stand will fold up into a straight stick, that may be carried in the hand. A stock of plates, enough for a day's work, may be carried in the pocket. The tourist can thus walk about without the slightest sense of incumbrance, and is prepared, at any moment, to take a view, either single or stereoscopic, of anything he sees—an operation which will occupy him from five to fifteen minutes, according to the light, and the time he may take to choose his position.

Considered as adding to the baggage of the traveller, these things are hardly worth mentioning—as, with the exception of the stand (which travels well in company with an umbrella), they will all lie snugly in a spare corner of a portmanteau. The stock of prepared plates will, of course, be regulated by the traveller's probable requirements during the time he is away.*

If the operator chooses to go to a little extra trouble, it is highly satisfactory to be able to *develop* the plates on the journey—which may conveniently be done in the evenings, at a hotel or lodging; and the apparatus for which adds very slightly to the bulk of the preparations. A small case of bottles, together with one or two small loose articles, are all the author takes with him. The development of a plate takes five or ten minutes, and is a process easily learnt; and the satisfaction of being able to see the same evening what one has been doing in the day is quite inducement enough to do it. But still, we repeat, this is not *necessary*, as the development may be left to another person and to another time.

We think we have shown how every traveller or tourist may be his own photographer, with much less trouble and difficulty than is generally supposed; and we must add that this is no untried plan. The writer of this article has been much in the habit of travelling; and, for years past, when he has gone on a journey, the little camera has been put into the portmanteau, as unassumingly and as regularly as the dressing-case. It has travelled in all sorts of countries, and has cast its eye on scenes which camera never looked at before; it has been a never-failing source of interesting occupation and amuse-

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* Extract from letter by Rev. F. W. Holland: "I have found india-rubber bands most useful for packing negatives. A band slipped round each end of every alternate plate will keep them from contact, and they may thus be packed together without fear of injury."—Ed.

ment, and has recorded its travels in hundreds of interesting views, some of much excellence, and very few otherwise than successful.

But it may be asked, Since the advantage and usefulness of this plan are so undeniable, how is it that we do not see it in more frequent use? Simply for the reason that the dealers in photographic apparatus have never yet had the enterprise to establish a manufacture and sale of dry prepared plates, in such a way as to insure their popularity.

The manufacture and sale of photographic apparatus and chemicals is now a very large branch of commerce; but many of the tradesmen who prosecute it appear to have a much more earnest view towards the profits of the business than to the advancement of the art—for, since the death of poor Mr. Archer (to whom we owe almost entirely the present state of photography, and who lost a fortune in its improvement), nearly every advance made has been by private individuals. We must not be misunderstood. There are many people who profess to sell dry plates, and these may often be found to possess many of the requisites they should have; but few can be depended on, and *none* combine all the qualities which are necessary to give the system the full benefit of its inestimable value. Some will not keep long enough before exposure; some will not keep at all after exposure; some fail in sensitiveness; some spoil soon after they are opened; to say nothing of the constant liability to stains, irregularities, blisters, and all sorts of troublesome and annoying defects, which not only spoil the operator's work, but—what is of more importance—destroy all reliance on his operations, and so discourage him from undertaking them. We are not sure whether some dealers may not be obtuse enough even to encourage defects, from the short-sighted notion of increasing the sale; but this we can say—that we know no maker who will guarantee the sincerity of his wish to make good plates, by consenting to allow for them if they turn out bad ones. If this state of things arose from imperfection in the art, we should not grumble, but could only urge improvement; but this is not so. It is well known that dry plates *can* be made,* satisfying all the conditions we have named, and which, with care and system in the manufacture, might be rendered thoroughly trustworthy. It is only the indolence or obstinacy of the trade that prevents their becoming regular articles of commerce.

We do not wish, however to discourage the traveller who may wish to adopt this admirable aid to his wanderings; for the object to be gained is so important that it is worth striving a little for. In the present state of the matter, he must either learn to prepare his own plates—which, after all, is no great exertion—or, if he buys them, he must at least learn to *develop* them, and must, at the same time, lay in with them a certain stock of patience and temper to meet disappointment; and we can assure him that, even at this price, he will find himself amply repaid. But we again urge that the case ought not to stand thus. The application of the dry processes to portable photography offers a boon almost inestimable to, but yet quite unappreciated by, the traveller and the tourist; and it only needs the zealous and earnest co-operation of the dealer, by so conducting the manufacture as to render it perfect and trustworthy, to raise this application into a branch of commerce of an extent, importance, and profit, little inferior to any in the trade.

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* Extract from letter by Dr. Kirk: "The dry collodion process, which I believe will now supersede almost all others, had not made much progress when we went out; but in order to test it I took with me plates, prepared and sensitised in England in January, 1858, which, when tried at various times, continued to yield pictures up to August, 1863, having been kept sensitive all the interval at Teté on the Zambezi."—Ed.

On the same Subject. By the Rev. H. B. GEORGE, formerly Editor of the 'Alpine Journal.'

It would scarcely be possible for travellers, even if skilled in the art, to obtain many photographs on an expedition which went beyond the limits of civilization, unless trustworthy dry plates could be procured. With them there is nothing to hinder travellers from taking photographs anywhere, and all needful knowledge can be acquired in an hour. And inasmuch as pictures taken on very small plates can now be enlarged with considerable success, the bulk of plates which must be carried is too small to be any burden; the plates of the Liverpool Dry Plate Company (which may be trusted, so far as the writer's experience goes, very thoroughly) weigh about 1 lb. per dozen, each plate giving two pictures.

The best apparatus for a traveller's purposes is known as Edwards' miniature apparatus, and is manufactured by Messrs. Murray and Heath, of 69, Jermyn Street. (N.B. Lane, of Hatton Garden, has patented one called "Multum in Parvo," which looks promising, but does not answer very well for rough work, and depending, as it does, entirely on Mackintosh cloth, is ill suited for hot climates. Messrs. Murray and Heath are introducing a new miniature camera, to take pictures 4 inches by 3 inches, instead of 2½ inches square, which packs very conveniently; but the writer has had as yet no opportunity of trying it. It is a question for each traveller whether the greater size of the pictures compensates for having to carry twice the weight of glass or for the loss of the possibility of taking stereoscopic pictures.) The camera is a cube of about 3½ inches, and the ordinary landscape lens fits inside it when packed up. This is better for rough work than any folding camera, which becomes useless if a fold cuts or wears through. The dark slide in which the plates are carried contains two plates back to back, on each of which two pictures can be taken. The writer's experience is, that two such slides, or eight pictures, are amply sufficient for a day's work, unless it is really devoted to photographing. A bit of black velvet to cover the camera is the only other thing necessary during the day. The store-box of plates, out of which the slides are filled at night, and into which the used plates are returned, will, of course, remain with the baggage. Pedestrians who are apt to quit their heavy baggage for several days at a time will find it convenient to have a small zinc box to hold about a dozen plates. Such a box, when full, weighs some 18 ounces, and, with the two dark slides, furnishes an ample provision of plates for several days. No other apparatus is absolutely necessary, except a stand for the camera; but it is highly desirable to take a second lens, with which pictures can be taken more rapidly. The ordinary Grubb lens, which requires an average of four minutes' exposure for dry plates, is best for landscapes, but useless for portraits, and not well adapted for buildings; a Ross lens should therefore be taken also in a separate case. Very possibly the Steinkeil or some other lens may be found to answer all purposes sufficiently well. The writer speaks only from his own experience. A little plate with a curved groove along it will make it possible to take stereoscopic pictures with this camera; and it is convenient to use this for views which are of sufficient importance to make a second attempt worth while. The whole of the above apparatus weighs less than 5½ lbs., and can be packed in a leather case measuring 7½ in. by 7½ in. by 4 in.

The stand is of very great importance, especially to the pedestrian, and various plans may be adopted according to the nature of the expedition. One rule, however, holds good in all cases: do not have the camera to screw directly to the stand, but let it screw on to a saddle-shaped clamp, to fit across the head of the stand, secured there by a set screw. The little clamp takes up no appreciable space, and the risk of the screw being injured on a

journey is removed. The stand may be an ordinary wooden tripod, which serves as a rather cumbrous walking-pole; a better thing is a small tripod, which fits round and serves to steady a pole with a flat head, over which the clamp goes. Such a tripod may be used alone when convenient, and is very handy on mountain tops, &c., where the height of the camera above the ground does not signify. The writer has carried such a tripod on an ice-axe, and finds that it interferes scarcely at all with the facility of using the axe. It might be adapted to any pole carried for other purposes, provided only the pole can have a flat head, or the clamp is altered accordingly.

The dry plates will keep almost any time before exposure, and for months after it, so that travellers may bring their plates home for development. But any one starting on a long journey will do well to learn how to develop his own plates (an easy thing enough), and carry with him the necessary apparatus, which weighs very little. Thus he will be able to see how he has succeeded, and correct the times of exposure accordingly; besides, the plates, when once developed, are safe from injury through accidental exposure to light.

The worst enemy of the dry-plate photographer is dust. He should not only keep his camera most carefully clean, wiping the lenses very frequently but also gently brush the plates over with a camel's-hair pencil whenever they are moved into the dark slides and back into the store-boxes. The boxes should be fastened up very carefully, both to exclude light and dust, and also to prevent their being opened by servants or through any inadvertency. It is, of course, necessary to keep a register of the views taken, and the best mode of doing this is by marking on each plate a number corresponding to that in the traveller's journal. This may be written at the time of changing in pencil on the rough back of the plate, but when it comes to be developed must be scratched on the corner of the collodion film. The dark slides should be numbered also for convenience of reference. The record of views taken ought to note, besides the date and subject, the hour, length of exposure, and state of weather.

The rules for determining the right length of exposure are simple in outline, but cannot be reduced to a formula. The operator must decide on the exact time required in each case by his own instinct; but the general principle is, that the greater amount of light received on the lens the more rapidly will the picture be printed; that is to say, a distant view requires less time than a near object, and an object bright in itself or brightly illuminated less than a dark object. Moreover, the amount of light diminishes in proportion to the distance from midday, and to the amount of cloud in the sky. As a rule, the morning is better than the afternoon; it seems also that as one goes higher the time of exposure tends to diminish. When in doubt, it is well to expose a little more: for if a plate is under-exposed, the picture is not there; if it is over-exposed, the picture is there, though more or less burnt, and a little management in developing will correct much of this.

There is no avoiding the ever-present difficulty that near and far objects, foreground and background, require, for perfection, different exposures. All we can do is to assimilate them as nearly as possible. If there is a great distance to be taken, choose a brightly-illuminated foreground: on a mountain top, for instance, prefer snow to rocks. Disturb the snow a little, if possible, to break its uniform surface; but rocks will not print themselves distinctly till the distance is burned. Similarly, it is impossible to obtain a satisfactory photograph of what is to the eye most attractive—a distant view framed in the branches of some closely overhanging tree; one must be sacrificed to the other. The scale ranges from a minute and a half, on snow, under a bright sun, for a very distant view—such, for instance, as one from the summit of Mont Blanc—to five minutes, or occasionally even more, for a deep ravine on a dull day, or a dark object very near at hand.

The outfit for an explorer should be:—

Camera with Grubb lens, } or some equivalent.
Ross lens, in a case, }

Extra lenses should be taken for safety on long expeditions.

4 dark slides. (See that they all work easily in the camera, and keep them as much sheltered from the sun as possible to prevent their warping. It is desirable to keep them wrapped up in black or yellow cloth or oil-silk.)

1 small zinc store-box, as above.

Wooden store-boxes, as many as may be required: those of the size usually made hold 36 plates or 72 pictures each.

Stand, according to circumstances.

2 or 3 clamps to fix camera on stand.

Plate for taking stereoscopic views.

Some black velvet, and plenty of india-rubber bands for holding the velvet over the camera.

HINTS ON THE PROJECTION OF ROUTES. By Staff-Commander C. GEORGE, R.N., Curator of Maps R.G.S.

For outdoor or field work the easiest method is by the plane projection, the data thus obtained being transferred to a Mercator's projection at the first halt or stopping station.

In the plane projection one equal length is assigned to all the degrees of latitude and longitude. It was first adopted on the erroneous supposition that the earth's surface is a plane. It is still the best for the traveller to use in his early attempts to project his journey, while the objects are still in sight. This projection is available as far as 20° on either side of the Equator;—beyond the parallel of 20°, and as far as 60°, Mercator's projection is preferable;—between 60° and the Pole, the distortion of both the plane and Mercator's projection is so apparent, that a polar or circular projection must be adopted.

Sheets of paper ruled into squares by strong lines and subdivided by finer ones, afford great assistance in map work.

For *outdoor* work, the scale of 1 inch to 1 mile is amply large enough to register every particular of one day's journey on a sheet 12 inches square:—the *indoor* or table-plan may be reduced to 10 miles to the inch, and plans for transmission home may be again reduced to 1 inch to 1 degree, when the larger plans cannot be sent.

The chief point aimed at by the following directions is to draw more attention than has hitherto been given to the "*true bearing*" of objects, for the following reasons:—

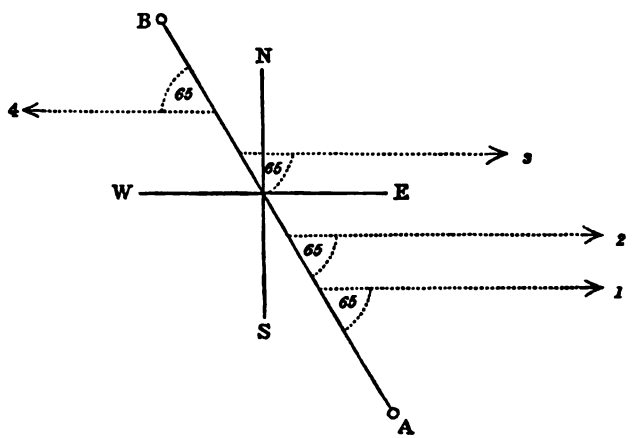
1st. Any object whose true bearing is *east* or west, must be in the same LATITUDE as the place of the observer.

2nd. Any object whose true bearing is north or south, must be in the same LONGITUDE as the place of the observer.

While travelling in a northerly or southerly direction from a station whose latitude is known, and carefully noting the distance and direction travelled, it is only necessary to watch when objects come to the "true" east or west; and their latitude is obtained.

When travelling in an easterly or westerly direction from a fixed station, noting distance and direction, it is only necessary to watch when objects come to the true north or south, and their difference of longitude can be obtained, by using Table B, p. 62, from the station left.

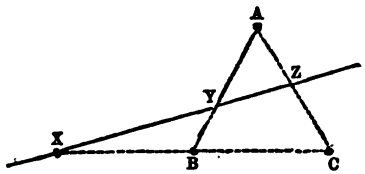
Thus, suppose a traveller passes from A, whose latitude is known, towards some distant hill, B; his route making an angle of 25° with the meridian. He sets his sextant to 65° (65° + 25° = 90°), or to 115° (180° − 65°); then as the objects 1, 2, 3, and 4, successively come into contact with B or A, as the case may be, he ascertains with precision the moment when they are truly E. or W. of him; and so, knowing the distance he has travelled from A, he can readily calculate or protract their latitude.



When the traveller, as will frequently be the case, has to deviate from the line of route, his position can be determined by compass or true bearing of any object, and an angle to a second object. Or he may have recourse to transit observations; that is to say, whenever two fixed objects come in line, an angle to a third object will determine the position with great accuracy.

Observe, that in travelling along X Y Z, the hills A B C can be mapped; for at X, or thereabouts, the bearing of B from C can be determined; at Y that of A from B; and at Z that of A from C; and so on for any number of hills. And it is very

important to recollect that it is not necessary to catch these lines of sight precisely; for by taking bearings twice, and the intermediate course approximately, there are sufficient data for



protracting out upon paper the required bearing. Thus, as soon as the peak of a distant hill is about to be occulted by the shoulder of a nearer one, a bearing should be taken; and again another one as soon as it has reappeared on the other side, and the intermediate course noted.

The advantage of this method of filling up a field-sketch will become more apparent as experience is gained. A third and accurate method of fixing the position is in general use among marine surveyors, but has hitherto been but little resorted to by land travellers, viz., by the angles subtended between three known objects. The instrument called the station-pointer is generally used for this purpose, but the position may also be found with a pair of compasses and a protractor, or, more simply, as follows, by means of a protractor and a sheet of tracing-paper. Draw a line through the centre of the paper; place the protractor on it near to the bottom of the sheet; lay off the right-hand angle to the right, and the left-hand angle to the left of the centre line; rule pencil-lines, radiating from the point over which the centre of the protractor has been placed, to the points that had been laid off; then place the paper on the plan or map, and move it about until the three lines coincide with the objects taken; prick through the points that lay beneath the centre of the protractor, and the observer's position is transferred to the plan. When possible, the centre object should be the nearest.

To Construct a Map on Mercator's Projection.

On a sheet of cartridge paper, 13 inches by 20, it is proposed to construct a map on Mercator's projection, on a scale of 10 miles to an inch equatorial—*i. e.* 6 inches to the degree of longitude.

Limits of the Map { Lat. 31° to 33° N.
Long. 34° to 36 E.

Draw a base-line, find its centre, and erect a perpendicular to the top of the paper; the extremes of longitude 34° and 36°

added together and divided by 2, give 35° the central meridian, and which is represented by the perpendicular; on each side of it lay off 6 inches, and erect perpendiculars for the meridians 34 and 36; divide the base line into 10-mile divisions, and the part from 35° 50′ to 36° 00′ into miles for the latitude scale.

From Table A, take the following quantities:—

Lat. 31° to 32°	= 1°	10′·4	= the distance between parallels	31°	and 32°
„ 32° to 33°	= 1°	11′·1	„ „ „	32°	„ 33°
	2°	21′·5	„ „ „	31°	„ 33°

Having thus obtained the distances between the required parallels, divide the map into squares of 10 miles each way, and the map is ready for the projection of the route.

The following is to explain what has been said on the subject of "true bearing" and the traveller's route, also to exercise him in the use of his protracting instruments, in laying down his route and observations, &c., and to draw his attention to objects noticeable around him; the field of exploration is supposed to be Palestine, and by comparing his sketch, with a map of the same, he will at once see his proficiency. The following symbols have been used:—

∠'s signifies angles.
△ a station in the triangulation.
⊖ „ fixed by latitude.
⊕ „ „ longitude.
⊕ „ „ lat. and long.
⊙ „ „ true bearing.
R. t. „ „ right tangent.
L. t. „ „ left „

The Field Book.

At No. 1 △.

From a village on the bank of a river in lat. 31° 00′ N. and long. 35° 17′ E., proceeded to an elevated position No. 2, and camped; the route was N. 6. E. by compass, the variation being 6° westerly: distance 5 miles.

At No. 2 △.

Early in the morning, when the sun was its own diameter above the horizon, measured with a sextant the angle between the northern limb of the sun and a distant high peak to the N.E.; the time being taken at the same moment, showed the watch to be about 5 min. slow.

With the azimuth compass several observations were made of N.E. peak; the needle being deflected after every observation, gave the mean reading of N. 36° 40′ E.; this object, of which the "true bearing" had been obtained, was, as is usually the case, then made "zero," and a round of sextant angles taken to conspicuous objects.

(A.)—Table to construct Maps on Mercator's Projection.

	0	1	2	3	4	5	6	7	8	9
°		° ′	° ′	° ′	° ′	° ′	° ′	° ′	°	° ′
0		1 00	1 00·1	1 00·1	1 00·1	1 00·2	1 00·3	1 00·4	1 00·5	1 00·6
10	1 00·9	1 01	1 01·2	1 01·5	1 00·7	1 02	1 02·2	1 02·6	1 02·9	1 03·3
20	1 03·6	1 04·1	1 04·5	1 04·9	1 05·5	1 05·9	1 06·5	1 07	1 07·7	1 08·2
30	1 09	1 09·6	1 10·4	1 11·1	1 12	1 12·8	1 13·7	1 14·6	1 15·7	1 16·
40	1 17·6	1 19	1 20·1	1 21·4	1 22·7	1 24·2	1 25·6	1 27·1	1 28·8	1 30·6
50	1 32·4	1 34·3	1 36·4	1 38·6	1 40·8	1 43·4	1 45·9	1 49	1 51·4	1 54·8
60	1 58·3	2 01·8	2 05·8	2 09·9	2 14·5	2 19·14	2 24·7	2 30·5	2 36·8	2 43·8
70	2 51·3	2 59·8	3 09·1	3 19·6	3 31·3	3 44·6	3 59·8	4 17 1	4 37·4	5 01·1
80	5 29·5	6 03	6 46·4	7 40·3	8 51·1	10 27·7	12 47·9	16 29·6	23 ·4·3	39 42·2

Use of the Table.

Find in the Table the required parallel: the tens at the side, and the units at the top. At their intersection, will be found, in degrees and minutes, the distance of the required parallel from the next less degree; to be measured from the scale of longitude on the map in progress.

Given the parallel of 30°—required that of 31°.

30 at the side, and 1 at the top, intersects at 1° 09′·6, the required distance of the two parallels.

Given the parallel of 31°—required that of 33°.

32° = 1° 10′·4
33° = 1° 11′·1

2° 21′·5 the distance between the 31° and 33° parallel.

∠'s and Observations.

Latitude by ✹'s N. and S. of zenith	31°	5′	30″ N.
True bearing of N.E. peak	N.	30	40 E.
Compass „	N.	36	40 E.

For height of △. Temp. of boiling-water 208°6. Aneroid 28°16
Temp. of air (in shade) .. .. .. 71°00

N.E. peak, and r. t. of lake to the eastward	53°	40′
„ near point on opposite side of lake ..	22	00
Two conical peaks in line and N.E. peak	30	40
Village on the sea-coast	85	05
Direction of this range	102	30
L. t. of near range	110	30
R. t. „	30	40

Remarks at this △. In the direction of N. 6 E. by compass were noticed two distant conical peaks in line, which at once determined the direction of route; it was also observed that the near range in the direction of the line of route was higher than No. 2 △, and on the way three streams would have to be crossed.

Proceeded onwards—

At No. 1 stream, ∠ between conical peak and N.E. peak	31°	10′
„ No. 2 „ „ „	32	00
„ No. 3 „ „ „	35	15

All these streams run eastward, towards the lake.

Arrived at the foot of No. 3 △, encamped for the night; had travelled, by estimation, N. 6 E. 12 miles. Observed for lat.

At No. 3 △, top of Range.

The morning amplitude was not obtained, the sun being obscured by clouds; waited half an hour until the sun had risen 15°, and then obtained a set of azimuth observations.

Latitude by ✹'s N. and S. of zenith	31°	14′ N.	
True bearing of N.E. peak	N.	37	10 E.
Compass bearing „	N.	43	10 E.
N.E. peak, and the low range of yesterday	125°	0′ to	174 30
„ and r. t. of lake	88	00	
β „ point on opposite shore of lake	53	30	
„ tongue point in lake stretching northward	23	30	
No. 1 village on sea-coast and N.E. peak	101	50	
No. 2 „ „	63	00	
Direction of this range „	153	30	

Remarks.—This bearing (β) is east true, therefore the point on opposite side of lake is in the same lat. as △ No. 3, and having been crossed by a true bearing from No. 2 △, it becomes a fixed point.

From this ∠ was obtained a good view of the lake (see Sketch-book) for that portion to the southward of east; from thence it appeared to run northerly, somewhat parallel to the line of route, with a breadth of 8 or 10 miles, and numerous feeders running into it from both sides, and nearly at right angles to the coast-line of the lake. In the direction of the intended route-line there appeared a great number of streams, all of which will be fixed

by angle between the conical peaks in line and N.E. peak; the line of route was kept by measuring angle between the third △ and the conical peaks, subtending ∠ of 180°.

Travelled on for the next two days, crossed several streams and fixed them; they apparently rose on the high land to the westward, and all running towards the lake; made about 25 miles northing, and then arrived at the nearest of the two conical peaks that had been kept in line.

At No. 4 △ South Conical Peak.

Lat. by ☉'s N. and S. of zenith	31° 41′ N.	⊖
True bearing of N.E. peak	N.76 0 E.	⊙
Compass „	N.82 0 E.	
For height of △. B. W. 208·30. Aneroid	28°·00	
Temp. of air "	67·00	
North conical peak to N.E. peak	76°·00′	
No. 1 village on sea-coast and N.E. peak	180·20	
No. 2 „ „	124·10	
Large town to northward on the western slope of the North conical peak and N.E. peak	78·10	
Mouth of large river falling into northern end of lake, and N.E peak	4·10	

Remarks.—This was the highes △ yet visited. From it were seen several rivers running from the high range westward of the line of route towards the sea, therefore it is the dividing range between the lake and the sea.

Travelled on 6 miles to the northernmost of the two conical peaks, taking care to keep in line between the conical peaks, and when there make it a recruiting ▲, and visited the town on the western slope.

∠'s at No. 5 △ North Conical Peak.

Lat. by ☉'s N. and S. of zenith	31° 46′ N.	⊖
True bearing of N.E. peak	N. 90 00 E.	⊙
Compass „	S. 84 00 E.	
For height of △. B. W. 207·00. Aneroid	27°·18	
Temp. of air	69·00	
A sharp peak and N.E. peak	33°·25′	
N.E. peak and No. 3	90·00	
Tangents of distant range running this way, and N.E. peak	95·30	
	101·35	
A point on the sea-coast and N.E. peak	102·00	
N.W. peak, and N.E. peak	87·15	
„ a sharp peak	53·50	

Remarks.—Finding by the true bearing that N.E. peak was in the same latitude as this △ No. 5, the line of route was altered to go to N.E. peak.

At 10 miles' distance travelled, observed that the west shores of the lake were south true ⊕.

At 16 miles travelled, arrived at the mouth of a river seen from No. 4 △ running into the lake from the north.

∠'s at Mouth of River.

Eastern shores of the lake	South (true) ⊕
No. 3 △, and last △ No. 5	63·30
Last △ No. 5, and run of large river, running north	92·40
Distant range to the N.W., runs to this △, ∠ to No. 5 ▲	64·30

Travelled on to the N.E. peak, or No. 6 △.

∠'s at No. 6 △ N.E. Peak.

Distance travelled from No. 5 △, 24 miles east (true).

Lat. by ●'s N. and S. of zenith	31° 46½′ ⊖
True bearing of sharp peak to northward	N. 3 30 E.
Compass „ „	N. 9 30 E.
For height of △. B.W. 211·00. Aneroid	29·42
Temp. of air	73·00
No. 5 △ and sharp peak	93·30′
No. 3 △ and No. 5	52·50
N.W. peak and sharp peak	24·50
„ No. 5 △	68·40

Proceeded northward to sharp peak No. 7 △; travelled 17 miles, crossed several streams, apparently the feeders to the large river running northward, fixed them by angles subtended between No. 5 ▲ and No. 6 △.

∠'s at No. 7 △ Sharp Peak.

Lat. by ●'s N. and S. of zenith	32° 03½′ ⊖
True bearing of a peak N.W.	N. 30 30 W. ⊙
Compass „	N. 24 30 W.
For height of △. B.W. 202·00. Aneroid ..	24·58
Temp. of air	74·00
N.W. peak, and flat-top mountain	49·20′
„ No. 6 △	145·35
No. 5 △ and N.W. peak	92·30

Travelled on towards N.W. peak; at 15 miles came to the large river running to the south.

∠'s at Large River.

N.W. peak, and flat-top mountain	92° 20′
Flat top mountain, and No. 7 △	90 40

At the distance of 26 miles, observe that No. 7 to flat-top mountain measured 59° 30′ ⊖.

At 30 miles' distance came to an elevated △, when the south end of a range to the westward measured 59° 30′ to N.W. peak, this gave the lat. of that part of the range, and at 44 miles came to N.W. peak.

∠'s at No. 8 ▲, or N.W. Peak.

Lat. by ●'s N. and S. of zenith	32° 42′ N. ⊖
True bearing of flat-top mountain	S.60 30 E. ⊙
Compass „	S.55 0 E.

For height of ▲. B. W. 210·50	Aneroid	29·00
Temp. of air		76·00
		° ′
S. end of a lake to the east, and flat-top mountain ..		29·30
No. 5 △, and sharp peak No. 7 △		33·40
„ „ 6 ▲		24·05
No. 5 ▲, and point on sea-coast		113·00
„ t's of near range		100·50
		26·30

Travelled east (true) towards the lake.

At 15 miles came to the lake, out of which flowed the large river going to the south. Height by B.W. = 213·25°.

Considering the large size of this river, and having already fixed the extreme and a midway △, decided upon returning southward and examine the river on the route back.

∠'s at South side of Lake on West bank of River.*

	°	′
No. 8 ▲ and No. 7	99	10
No. 7 ▲ and flat-top	32	00

∠'s at large Affluent from the Eastward.

	°	′
No. 8 ▲, and No. 7	118	40
No. 7 ▲ „ flat-top	39	50

∠'s at large Affluent from the Westward.

	°	′
Same objects	146	00
	58	10

∠'s at large Affluent from the Eastward.

	°	′
Same objects	79	00
	94	30

∠'s at sharp Bend of River.

	°	′
No. 7 ▲ due east (true)	⊖	
No. 8 ▲, and No. 7 ▲	104	10
No. 7 ▲, and No. 6 ▲	67	30

Arrived at former ▲, river running into lake from the northward. Height by B.W. = 214·5°.

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* These angles projected on a piece of *tracing-paper* will form a very good station-pointer, to determine this and the following ▲'s.

(B.)—GIVEN THE DEPARTURE, TO FIND THE DIFFERENCE OF LONGITUDE.

°	0	° 1	° 2	° 3	° 4	° 5	° 6	° 7	° 8	° 9
0		1·0001	1·0006	1·0013	1·0026	1·0038	1·0055	1·0075	1·0098	1·0125
10	1·0154	1·0187	1·0224	1·0261	1·0306	1·0353	1·0403	1·0457	1·0514	1·0578
20	1·0642	1·0711	1·0785	1·0864	1·0946	1·1034	1·1126	1·1224	1·1326	1·1434
30	1·1547	1·1666	1·1792	1·1924	1·2062	1·2208	1·2361	1·2521	1·2690	1·2868
40	1·3054	1·3250	1·3456	1·3673	1·3902	1·4142	1·4395	1·4663	1·4945	1·5242
50	1·5557	1·5890	1·6242	1·6616	1·7013	1·7435	1·7883	1·8361	1·8871	1·9416
60	2·0000	2·0626	2·1301	2·2027	2·2812	2·3662	2·4586	2·5593	2·6695	2·7904
70	2·9238	3·0716	3·2361	3·4204	3·6280	3·8637	4·1337	4·4454	4·8097	5·2406
80	5·7587	6·3925	7·1856	8·2057	9·5664	11·475	14·334	19·108	28·653	57·307

USE OF THE TABLE.

Find in the Table the required parallel, the tens at the side and the units at the top: at their intersection will be found a quantity which, multiplied by the departure, gives the "diff. of longitude."

The departure from the meridian on the parallel of 34° was 25 miles—required the diff. of longitude.

$$25' \times 1{\cdot}20 = 30'\ 00 \text{ the diff. of longitude.}$$

In the parallel of 60° the departure was 30 miles.

$$30' \times 2 = 60 \text{ miles, or 1 degree.}$$

In the parallel of 35° N. the route was N. 40 W., 37 miles' distance.

By Traverse Table, 40° course, $\underset{\text{Dis.}}{37} = \underset{\text{Dep.}}{23{\cdot}8} \times 1{\cdot}22 = \underset{\text{Miles.}}{29{\cdot}03}$, diff. of longitude.

TABLE FOR ROUGH TRIANGULATION WITHOUT THE USUAL INSTRUMENTS AND WITHOUT CALCULATION. By FRANCIS GALTON, F.R.S.

A traveller may ascertain the breadth of a river, or that of a valley, or the distance of any object on either side of his line of march, by taking about 60 additional paces and by making a single reference to the Table on the following page.

Suppose he is travelling from A to Z (Fig. I.), and wishes to learn the distance from A to C; and, it may be, also the angle A. Let him proceed as follows (referring now to Fig. II.).

1. Leave a mark at A. 2. Walk 10 paces towards Z, and make a mark, calling the place *m*. 3. Walk back to A. 4. Walk 10 paces towards C. 5. Walk to *m*, counting the paces to the nearest half-pace. (This gives the measurement of the line *a* (Fig I.), which is the chord of the angle A, to radius 10.) 6. Walk 80 paces towards Z; make a mark, calling the place *n*. 7. Walk 10 paces towards Z, calling the place B; this completes 100 paces from A. 8. Walk 10 paces towards C. 9. Walk to *n*, counting the paces to the nearest half-pace. (This gives the line *b*, which is the chord of the angle B, to radius 10.)

Now enter the Table with *a* at the side and *b* at the top, and read off the distance A C, and the Angle A if also required.

If the Table be entered with *b* at the side and *a* at the top, it gives B C (and B).

Of course the units need not be paces: feet, furlongs, miles, hours' journey, or anything else will do as well; and the units of A B need not be the same as those of *a* and *b*. Also any multiple or divisor of 100 for A B may be used, if the tabular number be similarly multiplied.

EXAMPLES.

a (in paces).	*b* (in paces).	A B.	A C.	Angle A.	B. C.	Angle B.
				° ′		° ′
5	6½	100 paces	67 paces	28 58	53 paces	37 56
5	6½	50 miles	33½ miles	28 58	26½ miles	37 56
10½	7	100 paces	68 paces	63 22	92 paces	41 0
10½	7	1000 paces	680 paces	63 22	920 paces	41 0

Particular care must be taken to walk in a straight line from A to B. It will surprise most people, on looking back at their track, to see how curved it has been, and how far B *n* is from

TABLE for rough Triangulation without the usual Instruments and without Calculation. By FRANCIS GALTON, F. R.S.

	ANGLE.	5	6	7	8	9	10	11	12	13	14
		0 ½	0 ½	0 ½	0 ½	0 ½	0 ½	0 ½	3 ½	0 ½	0 ½
	°										
5 0	28 58	57 60	64 67	70 73	75 78	81 84	87 89	92 95	98 101	105 109	113 118
½	31 56	55 59	62 65	69 72	74 78	81 84	87 90	93 96	100 103	107 112	116 122
6 0	34 56	54 57	61 64	68 71	74 77	80 84	87 90	94 97	101 105	110 115	120 126
½	37 56	53 56	60 63	67 70	74 77	80 84	87 91	95 99	103 108	113 119	125 132
7 0	41 0	52 55	59 63	66 70	73 77	81 85	88 92	96 101	106 111	117 123	130 139
½	44 4	51 55	58 62	66 70	73 77	81 85	89 94	98 103	109 114	121 128	136 146
8 0	47 10	50 54	58 62	66 70	74 78	82 86	91 95	101 106	112 118	126 134	144 156
½	50 20	49 53	57 61	65 70	74 88	83 88	92 98	103 109	116 123	132 141	153
9 0	53 30	49 53	57 61	66 70	75 79	84 89	94 100	106 113	121 129	139 150	
½	56 4	49 53	57 62	66 71	76 81	86 91	97 103	110 118	126 136	147	
10 0	60 0	48 53	57 62	67 72	77 82	88 94	100 107	115 123	133 145		
½	63 22	48 53	58 63	68 73	78 84	90 97	104 112	120 130	141 154		
11 0	66 44	49 53	58 64	69 74	80 86	93 100	108 117	127 138			
½	70 12	49 54	59 65	70 76	83 89	97 105	113 124	135 147			
12 0	73 46	50 55	60 66	72 79	85 93	101 110	120 131				
½	77 22	50 56	62 68	75 81	89 98	106 117	128 141				
13 0	81 6	52 57	64 70	77 85	93 103	113 125	138 155				
½	84 56	53 59	66 73	81 90	99 109	121 135	150				
14 ½	88 52	55 62	69 77	85 95	106 118	132 148					
	92 56	57 65	73 81	91 102	114 129	145					
15 0	97 10	60 68	77 87	99 110	126 143						
½	101 36	64 73	83 95	108 123	141						
16 0	106 16	60 79	90 105	121 140							
½	111 12	76 88	103 120	141							

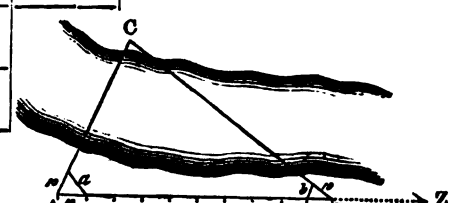

FIG. I.

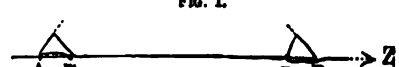

FIG. II.

To find A C and angle A:—Enter with a at the side and b at the top.

To find B C and angle B:—Enter with b at the side and a at the top.

pointing truly towards A. It is always well to sight some distant object in a line with Z when walking towards it.

The triangle A B C must be so contrived that none of its angles are less than 30°, or the chords of the angles at A and B will not be found in the Table. These cases cease to give reliable results when the measurements are rudely made, and have therefore been omitted.

Should a traveller have no Tables by him, he can always *protract* his measurements to a scale on a sheet of paper, or even on the ground, and so solve his problem. If real accuracy be aimed at, it is clear that it may be obtained by careful measurements of the base and chords, combined with a rigorous calculation, as was first suggested by Sir George Everest, formerly Surveyor-General of India. (See 'Journ. R. Geog. Soc.,' 1860, p. 122.)

Measurement of the Number of Cubic Feet of Water conveyed by a River in each Second.

The data required are—the area of the river-section and the average velocity of the whole of the current. All that a traveller is likely to obtain, without special equipment, is the area of the river-section and the average velocity of the *surface* of the current, which is less than that of its entire body, owing to frictional retardation at the bottom.

To make the necessary measurements, choose a place where the river runs steadily in a straight and deep channel, and where a boat can be had. Prepare a few floats, of dry bushes with paper flags, and be assured they will act. Post an assistant on the river-bank, at a measured distance, of about half the estimated width of the river, down stream, in face of a well-marked object. Row across stream in a straight line, keeping two objects on a line in order to maintain your course. Sound at intervals from shore to shore, fixing your position on each occasion, by a sextant-angle between your starting-place and your assistant's station, and throw the floats overboard, signalling to your assistant when you do so, that he may note the interval that elapses before they severally arrive opposite to him. Take an angle from the opposite shore, to give the breadth of the river.

To make the calculation approximately, protract the section of the river on a paper ruled to scale in square feet, and count the number of squares in the area of the section. Multiply this by the number of feet between you and the assistant, and divide

by the number of seconds that the floats occupied, on an average in reaching him.

Important rivers should always be measured above and below their confluence; for it settles the question of their relative sizes, and throws great light on the rainfall over their respective basins. The sectional area at the time of highest water, as shown by marks on the banks, and the slope of the bed ought also to be ascertained.

EXAMPLE.

DISTANCE FROM SHORE.	Starting-place.									Opposite Shore.	
Whence the boat started, measured in feet	0	90	160	240	330	420	500	600	700	780	
Depth at those distances measured in feet..	0	2	3½	4	4	5½	7	6½	3½	0	
Time required for float to drift opposite to assistant, measured in seconds	—	48	50	40	33	29	27	30	50	—	Average. 38·4

Distance of assistant, in feet, 150.

By proctracting the data in the first two lines, on ruled paper as described above, it will be found that the area of the section is 3260 feet or thereabouts; this, multiplied into 150, gives 489,000 cubic feet of water as the contents of the river at any given moment between the line of soundings and the assistant. As this amount passes by in 38·4 seconds, the number of cubic feet per second is the former number divided by the latter, which gives 12,734.

It must be distinctly understood that this number is only roughly approximative, and that is excessive. However, with the above data, an engineer would be able to make a somewhat better calculation. In the meanwhile, the traveller might consider the flow of the river in question, to be between 10,000 and 13,000 feet per second.

PAPER SQUEEZES OF INSCRIPTIONS. By the Rev. F. W. HOLLAND.

Some paper for "squeezes" should be taken, where inscriptions are likely to be met with. Many kinds of paper are suitable for this purpose, but that used by engravers is perhaps the best, since it combines a good substance and strength, with sufficient power of absorption. The process of taking squeezes is very simple. All dust or dirt should first be removed from the inscription with a rough brush. The paper should then be cut

to the requisite size, and laid upon it. With a soft close-haired brush, like a hat-brush, water should now be sprinkled upon the paper, and when thoroughly wetted, the brush should be used to press it into every portion of the inscription, so that a perfect impression may be taken. The paper should be left upon the inscription until thoroughly dry, and may then be rolled up without fear of spoiling the "squeeze." When the paper is thin, several sheets may be added, with the use of paste or rice-water, until sufficient substance be obtained. I have in this way taken excellent squeezes with merely whitey-brown paper. A store of paper, a few brushes, and a pair of large scissors for cutting the paper, are all the materials that are required.

HINTS ON THE COLLECTION OF OBJECTS OF NATURAL HISTORY.

By H. W. BATES, Assistant Secretary R.G.S.

Travellers who intend devoting themselves specially to Natural History will generally possess all the requisite information beforehand. It is to those whose objects or duties are of another nature, or who, whilst on a purely geographical land-exploration, wish to know the readiest means of collecting, preserving, and safely transmitting specimens they collect that the following hints are addressed:—

Outfit.—Double-barrel guns, with spare nipples; and a few common guns to lend to native hunters—especially if going to the interior of Tropical America.

Fine powder in canisters, and fine shot (Nos. 8 and 11), must be taken from England: coarse powder and shot can be had in any part. A good supply of the best caps.

Arsenical soap, a few pounds in tin cases; brushes of different sizes.*

Two or three scalpels, scissors (including a pair of short-bladed ones), forceps of different sizes, for inserting cotton into the necks of birds' skins; needles and thread.

A few small traps, with which to capture small (mostly nocturnal) mammals.

Strong landing-net for water mollusks, &c. Two stout insect *sweeping-nets.*

* Most of the articles of a Naturalist's outfit can be obtained, at a few days' notice, of Mr. E. T. Higgins, Natural History Agent, 24, Bloomsbury-street, W.C.

Cylindrical tin box for collecting plants, with shoulder-strap.

A few dozens of small and strong broad-mouthed bottles; and a couple of corked pocket-boxes.

Insect-pins; a few ounces of each Nos. 5, 14, and 11.

Stone jars for reptiles and fishes in spirit; to fit four in in a box, with wooden partitions. If animals in spirit are to be collected largely, a supply of sheet-tin or zinc, with a pair of soldering-irons and a supply of soft solder, must be taken instead of stone jars. Cylindrical cases can be then made of any size required. By means of the soldering apparatus, also, empty powder-canisters and other tin vessels can be easily converted into receptacles for specimens.

A ream or two of botanical drying-paper, with boards of same size as the sheet, and leather straps.

A few gross of chip pill-boxes in nests.

A dozen corked store-boxes (about 14 inches by 11 inches, and 2½ inches deep), fitted perpendicularly in a tin chest.

A few yards of india-rubber waterproof sheeting, as temporary covering to collections in wet weather, or in crossing rivers.

A set of carpenter's tools.

An outfit may be much lightened by having all the provisions and other consumable articles packed in square tin cases, and in boxes and jars of such forms as may render them available for containing specimens. If the traveller is going to the humid regions of the Indian Archipelago, South-eastern Asia, or Tropical America, where excessive moisture, mildew, and ants, are great enemies to the naturalist, he should add to his outfit two drying-cages; for everything that is not put at once into spirits is liable to be destroyed before it is dry enough to be stowed away in boxes. They may be made of light wood, so arranged as to take to pieces and put together again readily; one, for birds, should be about 2 feet 6 inches long by 1 foot 6 inches high and 1 foot broad; the other, for insects and other small specimens, may be about one-third less. They should have folding doors in front, having panels of perforated zinc, and the backs wholly of the latter material; the sides fitted with racks to hold six or eight plain shelves, which, in the smaller cage, should be covered with cork or any soft wood that may be obtained in tropical countries. A strong ring fixed in the top of the cage, with a cord having a hook attached at the end by which to hang it in an airy place, will keep the contained

specimens out of harm's way until they are quite dry, when they may be stowed away in close-fitting boxes. If this plan be not adopted, it will be almost impossible to preserve specimens in these countries.

Collecting.—The countries which are now the least known with regard to their Natural History, are New Guinea, and the large islands to the east of it, Northern Australia, the interior of Borneo, Thibet, and other parts of Central Asia, Equatorial Africa, and the eastern side of the Andes from east of Bogota to the south of Bolivia. In most of the better known countries the botany has been better investigated than the zoology, and in most countries there still remains much to be done in ascertaining the exact station, and the range, both vertical and horizontal, of known species. This leads us to one point, which cannot be too strongly insisted on, namely, that some means should be adopted by the traveller to record the exact locality of the specimens he collects. In the larger dried animals, this may be done by written tickets attached to the specimens; in pinned insects, a letter or number may be fixed on the pins of all specimens taken at one place and time—the mark to refer to a note-book. The initial letter, or first two or three letters of the locality, is perhaps the readiest plan; and when all the specimens taken at one place can be put into a separate box, one memorandum upon the box itself will be sufficient. Reptiles and fishes can have small parchment tickets attached to them before placing in spirits.

A traveller may be puzzled, in the midst of the profusion of animal and vegetable forms which he sees around him, to know what to secure and what to leave. Books can be of very little service to him on a journey, and he had better at once abandon all idea of encumbering himself with them. A few days' study at the principal museums before he starts on his voyage may teach him a great deal, and the cultivation of a habit of close observation and minute comparison of the specimens he obtains will teach him a great deal more. As a general rule, all species which he may meet with for the first time far in the interior, should be preferred to those common near the civilized parts. He should strive to obtain as much variety as possible, and not fill his boxes and jars with quantities of specimens of one or a few species. But, as some of the rarest and most interesting species have great resemblance to others which may be more common, he should avail himself of every opportunity of comparing the objects side by side. In most tropical countries the species found in open and semi-cultivated places are much less interesting than those inhabiting the interior of the forests, and it generally happens that the few

handsome kinds which attract the attention of the natives are species well known in European museums. In botany, a traveller, if obliged to restrict his collecting, might confine himself to those plants which are remarkable for their economical uses; always taking care to identify the flowers of the tree or shrub whose root, bark, leaves, wood, &c., are used by the natives, and preserving a few specimens of them. But, if he is the first to ascend any high mountain, he should make as general a collection of the flowering plants as possible, at the higher elevations. The same may be said of insects found on mountains, where they occur in great diversity—on the shady and cold sides rather than on the sunny slopes—under stones, and about the roots of herbage especially near springs, on shrubs and low trees, and so forth; for upon a knowledge of the plants and insects of mountain ranges depend many curious questions in the geographical distribution of forms over the earth. In reptiles, the smaller Batrachia (frogs, salamanders, &c.,) should not be neglected, especially the extremely numerous family of tree-frogs; lizards may be caught generally with the insect sweeping-net; the arboreal species seen out of reach may be brought down with a charge of dust-shot. Snakes should be taken without injuring the head, which is the most important part of the body; a cleft stick may be used in securing them by the neck, and on reaching camp they may be dropped into the jars of spirits. As large a collection as possible should be made of the smaller fishes of inland lakes and unexplored rivers; Dr. Gunther, of the British Museum, has authorized me to say that a traveller cannot fail to make a large number of interesting discoveries if he collects a few specimens of the species he meets with in the lakes and rivers of the interior of any country.

It can scarcely be expected that specimens of the larger animals can be brought away by a geographical expedition, although some species are still desiderata in the large museums of Europe. Additional specimens of all genera, of which there are numerous closely-allied species (*e. g.* rhinoceros, antelope, equus, &c.) would be very welcome for the better discrimination of the species. If only portions can be obtained, skulls are to be preferred. In humid tropical regions entire skins cannot be dried in time to prevent decay, and it is necessary to place them, rolled up in small compass, in spirits. The smaller mammals, of which there remain many to reward the explorer in almost all extra-European countries, may be skinned, dried, and packed in boxes in the same manner as birds. The smaller birds shot on an excursion should be carried to camp in the game-bag, folded in paper, the wounds, mouth, and anus

being first plugged with cotton. Powdered calcined gypsum will here be found very useful in absorbing blood from feathers, on account of the facility with which it can be afterwards cleared from the specimens. All plants, when gathered, are placed in the tin box which the traveller carries with him. Land and fresh-water shells may be carried home in a bag. All hard-bodied insects, such as beetles, ants, and so forth, should be placed, in collecting, in small bottles; each bottle having a piece of slightly-moistened rag placed within it, to prevent the insects from crowding and injuring each other. The hint previously given with regard to number of specimens must be repeated here. *Take as great a variety of species as possible.* The sweeping-net should be freely used (except in very wet weather) in sweeping and beating the herbage and lower trees. In collecting ants, it is necessary to open nests and secure the winged individuals of each species, which must be afterwards kept together with the wingless ones to secure the identification of the species. Bees and wasps may be caught in the net and then placed by means of small forceps in the collecting-bottle and afterwards killed in the same way as beetles and other hard-bodied insects. All soft-bodied insects should be killed on capture (by a slight pressure of the chest underneath the wings by thumb and finger) and then pinned in the pocket collecting-box. If the traveller has leisure and inclination for the pursuit, he may readily make a large and varied collection of these, and will do good service to science if he notes carefully the exact localities of his captures, altitude above the sea, nature of country, the sexes of the species (if detected), and information on habits. The delicate species should be handled very carefully and put away into the drying-cage immediately on return from an excursion. Spiders may be collected in bottles, and afterwards killed and pinned in the same way as other insects. Crustacea (shrimps, crawfish, &c.) in rivers and pools may be collected with the landing-net and afterwards well dried and pinned like hard-bodied insects except when they are large in size, when their bodies must be opened and emptied of their contents.

Preserving and Packing.—Previous to skinning a small mammal or bird, make a note of the colour of its eyes and soft parts, and, if time admits, of the dimensions of its trunk and limbs. It facilitates skinning of birds to break, before commencing, the first bone of the wings a short distance above the joint, which causes the members to lie open when the specimen is laid on its back on the skinning-board. The animal should be laid with its tail towards the right hand of the operator, and the incision made from the breast-bone nearly to the anus. A

blunt wooden style is useful in commencing the operation of separating the skin from the flesh. When the leg is reached, cut through the knee-joint and then clear the flesh from the shank as far as can be done, afterwards washing the bone slightly with arsenical soap, winding a thin strip of cotton round it and returning it to the skin. Repeat the process with the other leg, and then sever with the broad-bladed scissors the spine above the root of the tail. By carefully cutting into the flesh from above, the spine is finally severed without injuring the skin of the back, and it is then easy to continue the skinning up to the wings, when the bones are cut through at the place where they had previously been broken and the body finished as far as the commencement of the skull. A small piece of the skull is now cut away, together with the neck and body, and the brains and eyes scooped out, the inside washed with the soap, and clean cotton filled in, the eyes especially being made plump. In large-headed parrots, woodpeckers, and some other birds, the head cannot thus be cleaned; an incision has, therefore, to be made either on one side or on the back of the neck, through which the back of the skull can be thrust a little away and then cleaned, the incision being afterwards closed by two or three stitches. The bones then remaining in each wing must be cleaned, which must be done without loosening the quill-feathers. It is much better to take out the flesh by making an incision on the outside of the skin along the flesh on the inner side of the wing. The inside of the skin must now be washed with the soap, and a neck of cotton (not too thick) inserted by means of the long narrow forceps, taking care to fix the end well inside the skull and withdrawing the empty forceps without stretching the skin of the neck and thus distorting the shape of the bird. Skins need not be filled up with cotton or any other material, but laid, with the feathers smoothed down, on the boards of the drying-cage until they are ready to be packed in boxes. In very humid climates, like that of Tropical America, oxide of arsenic in powder is preferable to arsenical soap, on account of the skins drying quicker; but it cannot be recommended to the general traveller, owing to the danger attending its use.

In mammals the tail offers some difficulty to a beginner. To skin it, the root (after severing it from the spine) should be secured by a piece of strong twine, which should then be attached to a nail or beam; with two pieces of flat wood (one placed on each side of the naked root), held firmly by the hand and pulled downwards, the skin is made rapidly to give way generally to the tip. The tails of some animals, however, can be skinned only by incisions made down the middle from the

outside. The larger mammal skins may be inverted, and, after washing with the soap, dried in the sun: as before remarked, it is often necessary to roll them up and preserve in spirit.

The skins of small mammals and birds, after they are *quite* dry, may be packed in boxes, which must be previously well washed inside with arsenical soap, lined with paper and again covered with a coating of the soap and well dried in the sun. This is the very best means of securing the specimens from the attacks of noxious insects, which so often, to the great disgust of the traveller, destroy what he has taken so much pains to procure. Where wood is scarce, as in the interior of Africa, boxes may be made of the skins of antelopes or other large animals by stretching them, when newly stripped from the animal, over a square framework of sticks, and sewing up the edges; after being dried in the sun they make excellent packing-cases.

With regard to reptiles and fishes, I cannot do better than quote the following remarks sent to me by Mr. Osbert Salvin, who collected these animals most successfully in Guatemala:—

"Almost any spirit will answer for this purpose, its fitness consisting in the amount of alcohol contained in it. In all cases it is best to procure the strongest possible, being less bulky, and water can always be obtained to reduce the strength to the requisite amount. When the spirit sold retail by natives is not sufficiently strong, by visiting the distillery the traveller can often obtain the first runnings (the strongest) of the still, which will be stronger than he requires undiluted. The spirit used should be reduced to about proof, and the traveller should always be provided with an alcoholometer. If this is not at hand, a little practice will enable him to ascertain the strength of the spirit from the rapidity with which the bubbles break when rising to the surface of a small quantity shaken in a bottle. When the spirit has been used this test is of no value. When animals or fish are first immersed, it will be found that the spirit becomes rapidly weaker. Large specimens absorb the alcohol very speedily. The rapidity with which this absorption takes place should be carefully watched, and in warm climates the liquid tested at least every twelve hours, and fresh spirit added to restore it to its original strength. In colder climates it is not requisite to watch so closely, but practice will show what attention is necessary. It will be found that absorption of alcohol will be about proportionate to the rate of decomposition. Spirit should not be used too strong, as its effect is to contract the outer surface, and thus, closing the pores, prevent the alcohol from penetrating through to the inner parts of the specimen. *The principal point, then, is to*

watch that the strength of the spirit does not get below a certain point while the specimen is absorbing alcohol when first put in. It will be found that after two or three days the spirit retains its strength: when this is the case, the specimen will be perfectly preserved. Spirit should not be thrown away, no matter how often used, so long as the traveller has a reserve of sufficient strength to bring it back to its requisite strength.

"In selecting specimens for immersion, regard must be had to the means at the traveller's disposal. Fish up to 9 inches long may be placed in spirit, with simply a slit cut to allow the spirit to enter to the entrails. With larger specimens, it is better to pass a long knife outside the ribs, so as to separate the muscles on each side of the vertebræ. It is also as well to remove as much food from the entrails as possible, taking care to leave all these in. The larger specimens can be skinned, leaving, however, the intestines in, and simply removing the flesh. Very large specimens preserved in this way absorb very little spirit. All half-digested food should be removed from snakes and animals. In spite of these precautions, specimens will often appear to be decomposing; but by more constant attention to re-strengthening the spirit, they will, in most cases, be preserved.

"A case (copper is the best), with a top that can be unscrewed and refixed easily, should always be carried as a receptacle. The opening should be large enough to allow the hand to be inserted; this is to hold freshly-caught specimens. When they have become preserved, they can all be removed and soldered up in tin or zinc boxes. Zinc is best, as it does not corrode so easily. The traveller will find it very convenient to take lessons in soldering, and so make his own boxes. If he takes them ready made, they had best be arranged so as to fit one into another before they are filled. When moving about, all specimens should be wrapped in calico or linen or other rags to prevent their rubbing one against the other. This should also be done to the specimens in the copper case when a move is necessary, as well as to those finally packed for transmission to Europe. These last should have all the interstices between the specimens filled in with cotton-wool or rags. If a leak should occur in a case, specimens thus packed will still be maintained moist and will keep some time without much injury. Proof spirit should be used when the specimens are finally packed, but it is not necessary that it should be fresh."

Land and fresh-water shells, on reaching camp, should be placed in a basin of cold water to entice the animals out, and then, after draining off, killed by pouring boiling water over them. They may be cleared of flesh by means of a strong pin

or penknife. The operculum or mouthpiece of all shells which possess it should be preserved and placed inside the empty shell. Each shell, when dry, should be wrapped in a piece of paper and the collection packed in a box, well padded with cotton or other dry and elastic material.

The insects collected on an excursion should be attended to immediately on arrival in camp. When leisure and space are limited, all the hard-bodied ones may be put in bottles of spirit; and each bottle, when nearly full, should be filled up to the cork with a piece of rag, to prevent injury from shaking. Many species, however, become stained by spirit, and it is far better in dry countries, such as Africa, Australia, and Central Asia, to preserve all the hard-bodied ones in a dry state in pill-boxes. They are killed, whilst in the collecting-bottles, by plunging, for a few moments, the bottom half of the bottles in hot water. An hour afterwards the contents are shaken out over blotting-paper and put into pill-boxes—the bottom of the boxes being padded with cotton, over which is placed a circular piece of blotting-paper. The open pill-boxes should then be placed in the drying-cage for a day or two and then filled up with more cotton, the layer of insects being first covered by a circular piece of paper.* The soft-bodied specimens, which are brought home pinned, should be stuck in the drying-cage until they are dry, and then be pinned very close together in the store-boxes. The store-boxes, both bottom and sides, should each have inside a coating of arsenical soap before they are corked, and as they become filled, one by one, should be washed outside with the soap and pasted all over with paper. Camphor and other preservatives are of little or no use in tropical climates. In some countries where the traveller may wish to make a collection of the butterfly fauna, the best way is to preserve all the specimens in little paper envelopes. He should be careful not to press the insects too flat, simply killing them by pressure underneath the breast, folding their wings carefully backwards and slipping them each into its envelope. In very humid tropical countries, such as the river valleys of Tropical America and the islands of the Eastern Archipelago, the plan of stowing away even hard-bodied insects in pill-boxes does not answer, on account of the mould with which they soon become covered. There are, then, only two methods that can be adopted: one preserving them at once in spirits, the other pinning all those over a quarter of an inch long (running the pin through the right wing-case so as to come out beneath,

* The only preservative needed is a diluted wash of arsenical soap inside the pill-boxes, which, as in all other cases when soap is used, must be well dried afterwards, before the boxes are filled.

between the second and third pair of legs); and gumming those of smaller size on small sheets of card, cut of uniform size so as to fit perpendicularly in racked boxes, like those used to contain microscopical slides, but larger. The cards may be a few inches square, and each may hold several scores of specimens, very lightly gummed down a short distance apart. After the cards are filled they should be well dried, and the box containing them washed outside with arsenical soap and pasted over with paper. All the pinned specimens should be placed to dry for a few days in the drying-cage, and afterwards pinned very close together in the corked store-boxes.

Plants are dried by pressure, by means of the boards and straps, between sheets of botanical drying-paper—the paper requiring to be changed three or four times. When dry, the specimens may be placed between sheets of old newspapers, together with the notes the traveller may have made upon them, each placed upon the object to which it refers. Bundles of papers containing plants are not of difficult carriage; but they require to be guarded against wet, especially in fording rivers and in rainy weather, and should be wrapped in skins or india-rubber sheeting until they can be safely packed in wooden boxes and despatched to Europe. Seeds may be collected when quite ripe and preserved in small packets of botanical paper, with a number written on referring to preserved specimens of the flowers. Dry fruits and capsules should be collected when in countries not previously explored by botanists, if the traveller has means of identifying the species to which they belong.

Fossils.—The collection of fossils and minerals (except in the case of the discovery of new localities for valuable metals) is not to be recommended to the traveller, if he is not a Geologist. Fossils from an unexplored country are of little use unless the nature and order of superposition of the strata in which they are found can be at the same time investigated. In the cases, however, of recent alluvial strata, or the supposed beds of ancient lakes, or deposits in caves, or raised sea-beaches containing shells or bones of vertebrate animals, the traveller will do well to bring away specimens if a good opportunity offers. If the plan of the expedition includes the collection of fossil remains, the traveller will, of course, provide himself with a proper geological outfit and obtain the necessary instructions before leaving Europe.

All collections made in tropical countries should be sent to Europe with the least possible delay, as they soon become dete-

riorated or spoilt unless great care be bestowed upon them. Dry skins of animals and birds may be packed in wooden cases simply with sheets of paper to separate the skins. Shells and skulls should be provided with abundance of elastic padding, such as cotton. The boxes containing insects and crustacea should be placed in the middle of large boxes surrounded by an ample bed of hay or other light dry elastic material: if this last point be not carefully attended to, it will be doubtful whether such collections will sustain a voyage without much injury.

Travellers have excellent opportunities of observing the habits of animals in a state of nature, and these hints would be very deficient were not a few words said upon this subject. To know what to observe in the economy of animals is in itself an accomplishment which it would be unreasonable to expect the general traveller to possess, and without this he may bring home only insignificant details, contributing but little to our stock of knowledge. One general rule, however, may be kept always present to the mind, and this is, that anything concerning animals which bears upon the relations of species to their conditions of life is well worth observing and recording. Thus, it is important to note the various enemies which each species has to contend with, not only at one epoch in its life, but at every stage from birth to death, and at different seasons and in different localities. The way in which the existence of enemies limits the range of a species should also be noticed. The inorganic influences which inimically affect species, especially intermittently (such as the occurrence of disastrous seasons), and which are likely to operate in limiting their ranges, are also important subjects of inquiry. The migrations of animals, and especially any facts about the irruption of species into districts previously uninhabited by them, are well worth recording. The food of each species should be noticed, and if any change of customary food is observed, owing to the failure of the supply, it should be carefully recorded. The use in nature of any peculiar physical conformation of animals, the object of ornamentation, and so forth, should also be investigated whenever opportunity occurs. Any facts relating to the interbreeding in a state of nature of allied varieties, or the converse — that is, the antipathy to intercrossing of allied varieties—would be extremely interesting. In short, the traveller should bear in mind that facts having a philosophical bearing are much more important than mere anecdotes about animals.

To observe the actions of the larger animals, a telescope or opera-glass will be necessary, and the traveller should bear in mind, if a microscope is needed in his journey, that by unscrewing the tubes of the telescope, in which all the small glasses are contained, a compound microscope of considerable power is produced.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED FEBRUARY 27TH, 1872.]

SESSION 1871-72.

First Meeting, 13*th November*, 1871.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTATION.—*Andrew Holmes Reed, Esq.*

ELECTIONS.—*Robert Barnes, Esq.*, M.D.; *Major A. K. Comber* (Deputy Commissioner of Assam); *Henry T. W. Holt, Esq.*; *Lord Lyveden*; *Joseph H. M'Clure, Esq.*; *Duncan M. Macnab, Esq.*; *Walter H. Medhurst, Esq.* (H.M. Consul at Shanghai); *William Square, Esq.*; *William B. Sills, Esq.*

ACCESSIONS TO THE LIBRARY FROM JUNE 26TH TO NOVEMBER 13TH, 1871.—'Our Ocean Highways.' By J. M. Dempsey and W. Hughes. 1871. Donors the authors. 'Names of Places, &c., in China.' By E. Porter Smith. Shanghai, 1870. Donor H. S. Hollingworth, Esq. 'Travels in North and South Carolina.' By W. Bartram. 1792. Purchased. 'Unter den Tropen.' By C. F. Appun. Vols. I. and II. Jena, 1871. Purchased. 'On an Equal Surface Projection for Maps of the World.' By C. Piazzi Smyth. Edinburgh, 1870. Donor the author. 'Reference Book of Modern Geography.' By C. Ewald. 1870. Donor the author. 'Curso Elemental de Geografia.' By D. B. Monreal y Ascaso. Madrid, 1870. Donor the author. 'Om Eskimœrnes herkomst af H. Rink.' Copenhagen, 1871. Donor the author. 'On the Antechamber of the Great Pyramid.' By Capt. Tracey. Edinburgh, 1871. Donor the author. 'Inaugural Lecture in aid of Social Progress in India.' By J. T. Prichard. Donor the author. 'Darwinism, &c.' By Chauncey Wright. 1871. Donor J. Murray, Esq. 'Earthquakes of New England.' By W. J. Brigham. 1869.

Donor the author. 'Die Reptilfauna der Gosau-Formation.' By Dr. E. Bunzel. Wien, 1871. Donor the author. 'Die Cephalopoden. Fauna der Oolithe, &c.' By Dr. M. Neumayer. Wien, 1871. Donor the author. 'Foot-prints in East Africa, &c.' By Thomas Wakefield. 1866. Donor Rev. R. Brewin. 'Expedition ins Siberische Eismeer, &c.' By A. Rosenthal. Donor Dr. A. Petermann. 'Alturas en la Republica del Ecuador.' By W. Reiss and A. Stubel. 1871. Donors the authors. 'Geological Survey of California.' By F. B. Meek and W. M. Gabb. 3 vols. 1864. 'Ornithology of California.' By J. G. Cooper. Presented by the State. 'Andes and Amazon.' By J. Orton, 1869. 'Memoirs of the War, &c.' By H. Lee. 1869. 'Transatlantic Sketches.' By G. J. Chester. 1869. Donor H. W. Bates, Esq. 'Daily Life, &c., of the Tasmanians.' By James Bonwick. Donors the publishers. 'Guide to Baden Baden.' By W. B. Flower. 1865. Donor S. M. Drach, Esq. 'Industrial Progress of New South Wales.' 1871. Donor C. Cowper, Esq. 'The Barons' War, &c.' By W. H. Blaauw. 1871. Donor the author. 'Address to Geographical Section of the British Association, Edinburgh.' By Col. H. Yule. 1871. Donor the author. 'The Book of Ser Marco Polo the Venetian.' By Col. H. Yule. Purchased. 'Ueber Colonien, &c.' By F. V. Hellwald. Donor the author. 'Florida: its Climate, &c.' New York, 1870. Donor S. M. Holmes, Esq. 'Voyages dans la Basse et la Haute Egypte, &c.' By Vivant Denon. 1809. Donor Admiral Sir W. Hall. 'Geological Survey of Canada.' By A. R. C. Selwyn. Montreal, 1870. Donor the author. 'Wilhelm Haidinger.' By M. A. Becker. Wien, 1871. Donor the author. 'Reisen in Ost Afrika.' By C. von der Decken. Vol. II. Purchased. 'Aymara Indians of Bolivia and Peru.' By D. Forbes. 1870. Donor the author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF JUNE 26TH, 1871.—The Accessions consist of 67 maps on 138 sheets. The following are the principal, viz.:—Six Maps and Sections of portions of the Bhawulpoor State. By John W. Barns, Superintendent of Canal Irrigation. Presented by the author. Admiralty Charts (12 in number). Presented by the Hydrographic Office. Six Maps of Mexico. Presented by Capt. Mayne Reid. Stieler's Hand-Atlas. Parts 1 and 2. Spruner's Ancient Atlas. Parts 1 and 2. Route and Telegraph Map of the World, on Mercator's Projection; and Diagram of a system of International Communication by Telegraph, Post or Express. By Charles Bowles. Presented by the author. Geological Sketch-Map of the Parish of

Beechworth (Victoria, Australia). By T. J. Dunn. Plan showing the Operations of the Fifth Army Corps before Paris, 1871, von Pirscher, Engineer Officer V. Armée-Corps. Versailles, 1871. Presented by General Beauchamp Walker. Bacon's Great Map of London. Scale 9 inches = 1 mile (on rollers). Presented by the publisher. Elliptical Map of the World. Designed by G. T. Edkins. (On rollers.) Presented by the author. Maps of the Government Survey of India, 15 maps on 83 sheets. Presented by Her Majesty's Secretary of State for India. Six Maps by Augustus Petermann, Esq. Presented by the author. Map of the City of Bangkok. Compiled from the Surveys of Luang Bhi-Jay-Sar-Oetz, second King of Siam.

The PRESIDENT opened the Session with the following Address:—

GENTLEMEN,—Before proceeding to the ordinary business of the meeting, it is my painful duty to remind you of the irreparable loss which the world of science in general and this Society in particular, has sustained in the death of our late revered and beloved President, Sir Roderick Murchison. A full account of Sir Roderick's public career, and of the great services which he has rendered to the cause of Geography will, according to established rule, appear in my next Anniversary Address; but in the mean time I trust that, under the peculiar circumstances of the case, I may be permitted to give brief expression to the feelings with which, in common I am sure with all around me, I cannot help regarding the terrible calamity that has befallen us. A cry of grief has arisen through the length and breadth of the land at the death of this good and able and noble-minded man. In other countries, when a great light is quenched, it is the custom to pronounce an elaborate funereal eulogy over the grave of the deceased. In this country much speaking is thought to impair the dignity of sorrow. We feel our loss too deeply to dwell on it in words.

It must be a consolation, however, to Sir Roderick's relatives to know that all classes, from the Queen upon the throne to the working scholar in his humble abode, have testified their profound sorrow at his death. The press has teemed with obituary notices, bearing full and truthful witness to Sir Roderick's great qualities and to the universal estimation in which he was held. The science of England, indeed, has lost a powerful and earnest patron. Geography has lost its leading light. Every one of us has lost a dear and valued friend. I could not have said less on this painful occasion: I trust I shall be excused from saying more.

I have now the honour, on opening the present Session of the

Royal Geographical Society, to congratulate the Fellows on our being again permitted to meet in this handsome and commodious Hall. There can be no doubt that the credit and popularity of the Society are much enhanced, and its means of usefulness proportionably increased, by our being enabled to meet in a building which combines so many advantages of size and comfort and elegance; and we feel, therefore, that the Senate of the London University, in placing their noble Theatre at our disposal, has conferred an obligation not only upon our limited scientific body, but upon the public at large, whose instruction and education form the special objects of our study. I am sure, then, I only represent the sense of the Meeting in expressing our warmest thanks to the Senate for the consideration which they have shown us.

In the next place, I have to announce to the Meeting that during the recess the Royal Geographical Society has migrated from its former temporary quarters in Whitehall Place to its permanent abode in Savile Row, where it is now located on its own freehold estate, in large and handsomely-decorated rooms, and with every convenience in the way of maps, charts, and books of reference, which are held available for consultation not only by Members but by all who are interested in geographical inquiry. The Society is much indebted to the Fitting Committee, presided over by Mr. James Fergusson, for the efficient manner in which everything has been arranged on the new premises. The apartments are not yet quite ready for the reception of the public, but they will be soon completed; and it is proposed accordingly, at a later period of the Session, after the business of the evening has terminated in this Hall, to hold adjourned meetings in the new House, where the members, over their tea and coffee, may revive, if they please, a discussion of the papers that have been read, and examine at their leisure the various sketches or other objects that may have been brought forward in illustration.

I now proceed briefly to summarise the various matters of geographical interest which have taken place since our Anniversary Meeting at the end of May. The Fellows of the Society will remember with pride and satisfaction that at an Extraordinary Meeting, held for the purpose in July, his Majesty the Emperor of Brazil did us the honour of attending and taking a part in our discussion. His Imperial Majesty has ever testified a warm interest in our proceedings, and that interest, I am assured, has been much enhanced by his personal acquaintance with our working arrangements.

The next subject to be noticed is the Meeting of the British

Association at Edinburgh. The proceedings of the Geographical Section of the Association are, as is well known, identified to a large extent with our own work. We supply most of the papers that come before the Section; our Secretaries attend the Meetings; and the Section is always presided over by one of our most distinguished geographers. On the late occasion, our medallist of last year, Dr. Keith Johnston, so well known as a physical geographer of eminence, had been selected for the presidential chair of Section E; but ere the day of meeting arrived he was no more, leaving a blank in the scientific world which it will be difficult to fill; and his place at the Council Board of the Association was accordingly supplied by one who to a long official career of usefulness and distinction has lately added the very highest literary eminence by the publication of two most remarkable works, 'Cathay' and 'Marco Polo,'—works which for their general merits as well-written books would have placed their author, Colonel Yule, very high among men of letters, but which also, from the extraordinary amount of special learning and research that they exhibit, proclaim him as "*facile princeps*" among Central Asian geographers. Like everything else which proceeds from the pen of Colonel Yule, the Address delivered by him at Edinburgh, and since printed in the form of a pamphlet, is of the utmost interest and well worthy the attention of all Fellows of this Society. Nowhere, indeed, have I ever seen a more able and instructive summary of the present state of our knowledge of the countries between India and China; and it is, moreover, highly creditable to the strength and independence of Colonel Yule's judgment that, while he encourages the notion of Government surveys and explorations (to a certain extent) beyond our frontier, he steadily resists as premature, if not altogether impracticable, those costly schemes for a railway through the jungles of Burmah to the interior of Western China which, for many years past, have been so persistently pressed upon the public notice.

Another matter in which our Society naturally takes a very deep interest is the International Congress of Geographers, which was this year inaugurated at Antwerp, and which it is proposed to hold during succeeding years in the different capitals of Europe. No very important announcement was made at this year's meeting, either in regard to Physical Geography in general, or to any particular field of exploration and discovery; but a good basis was established for future operations, and there can be no doubt but that the interests of Science must be forwarded by any arrangement which thus brings the travellers and geographers of the various

nations of the world into personal and friendly communication. The system pursued at the Congress, of introducing and discussing formal propositions of a general or international character, instead of reading papers of a limited or local interest, will be more appropriately considered in my Annual Address to the Society. Here I will only say that some of the propositions, thus formulated,—such as the adoption of a common first meridian for all nations, the organization of a Pan-European Oceanic Survey, &c., —were of the utmost importance to Geography, and deserve our most serious attention. Vice-Admiral Ommanney, who was most honourably and cordially received by the Congress as the delegate of the Royal Geographical Society of London, and who took an active part in the work of the meeting, has furnished the Council with a full and valuable Report upon the subject, which, I hope, will be published in the next number of our 'Proceedings.'

I have now to refer to another subject of great scientific interest. Last winter we had the pleasure of listening to a very lucid exposition by Dr. Carpenter, illustrated by experiments, of the laws which, in his opinion, caused and governed Oceanic circulation. This theory, which attributed ocean currents throughout the world to a variation of the specific gravity of sea-water produced by differences of temperature, has met with considerable opposition—particularly from Mr. Croll, of the Geological Survey of Scotland, who has published a well-reasoned paper on the subject in the last number of the 'Philosophical Magazine;' and also from the experienced hydrographer, Captain Spratt, R.N., who developed his views with much ability in a paper that was read during last session before the Royal Society. Captain Spratt especially called in question Dr. Carpenter's assumption of the existence of an under-current flowing outwards from the Mediterranean through the Straits of Gibraltar, on which, as you are aware, Dr. Carpenter greatly relied for his inference that a similar oceanic movement prevailed throughout all seas. It is important, then, to learn that Dr. Carpenter, having resumed his investigations during the autumn vacation, has now demonstrated by careful experiment that this much-disputed under-current at the Straits of Gibraltar does positively exist. In connection with this subject I may further announce that, with a view of extending our knowledge, which is at present but vague and imperfect, of the temperature, condition, and currents of the ocean at various depths, Dr. Carpenter has laid before the Government a proposal to organize a scientific expedition, for the express purpose of exploring thoroughly certain portions of the Pacific. The Royal Society and other scientific bodies have cordially

seconded this recommendation, and we understand that the proposal has been favourably received at the Admiralty. It need hardly be added, that our Society is desirous of co-operating in this work of exploration, feeling, as we do, assured that the results must be of importance in leading to our better acquaintance with the Physical Geography of the globe.

I shall now briefly report on the progress of Geography since our last Anniversary Meeting. One of the most interesting portions of the admirable address which was composed for that occasion by our late veteran President Sir Roderick Murchison, referred to the Arctic Regions, which have so long been one of England's proudest fields of discovery. It is true that of late years our Government has relaxed its efforts in this quarter, but private enterprise has to some extent supplied the place of public patronage. Mr. Lamont, at any rate—whose expedition to the East of Spitzbergen in 1869 was not successful, owing to the exceptional severity of the season—is understood to contemplate further exploration; and there is also reason to hope that, next season, one of our most distinguished Associates will proceed in a vessel of his own to the coast of Eastern Greenland, where he will endeavour to follow up the discoveries of the late German Expedition, by thoroughly exploring the great "Fiords" which run far into the interior of the country. In the mean time another German expedition, conducted by Messrs. Payer and Weyprecht, has achieved, as we are told, important results. These gentlemen proceeded to König Karl Land in the latter part of the summer; and we now learn that they have discovered to the east of Spitzbergen, in 40° to 42° East longitude, an open polar sea free from ice, as high up as the 79th parallel of latitude. If this is the highest point to which the expedition penetrated they cannot lay claim to any real Polar discovery, since Parry, twenty degrees further west, reached a point nearly three degrees further to the north; but at the same time, if their expedition has determined the fact of an open Polar sea in this quarter, they must be admitted to have done good service to Geography.

Much was expected at one time from an American expedition under Captain Hall, which was supported by a grant of money from Congress, and which left New York on the 14th of June in the hope of reaching the Pole on sledges over the ice. Captain Hall was at Holsteinberg in West Greenland on the 1st of August, and intended pushing on for Smith's Sound, where he hoped to obtain dogs for his sledges, but the prospects of the expedition were not at that time promising, the sailing master, according to Dr.

Walker's report, having already returned home from Disco, and the party generally being dissatisfied and showing signs of disorganisation. Another American expedition, has also been projected by a Mr. Octave Pavy. This gentleman hoped to reach Wrangell Land from Behring Straits with reindeer and dog-sledges, and at that point if, as expected, open sea was found to the north, he proposed to embark in a "monitor" raft, formed of water-tight cylinders connected by planks, and so reach the Pole.

Russia has also been displaying much activity in Arctic research. Last summer an Arctic voyage was accomplished by the Grand Duke Alexis in the corvette *Warjäg*, during which important observations on the currents and temperature of the sea were made by the veteran geographer Von Middendorf, off the western coasts of Nova Zembla. A more definite and elaborate Russian expedition is now in course of preparation, having for its principal object an attempt to reach the Pole, but being also destined to study the geography and climate and industrial condition of the Siberian coast. A preliminary expedition of the same character but on a far more limited scale has been reconnoitring, we believe, during the summer in the Siberian Sea.

The Swedes have further despatched a vessel under Baron Von Otter to the west coast of Greenland during the late summer, to bring away a large mass of meteoric iron that has been discovered there; and the well-known Mr. Rosenthal has sent out in his own ships scientific observers to the seas east of Spitzbergen. This gentleman was an active promoter of the first German expedition and his liberality and zeal in the cause of Arctic discovery merit the warm acknowledgments of all geographers.

On the great continent of Asia, geographical knowledge is ever making a steady, if not a rapid, progress. Russian explorers on the one side, and English on the other, are constantly making inroads on the "terra incognita" of Central Asia, which forms a debatable ground between the two great Asiatic empires. Russia having conquered and annexed Zungaria, has now launched an exploring expedition along the southern skirts of Mongolia, which will probably ascertain the true positions of Oosh-Turfan, Ooroomchi, and Hamil, and enable us to define with precision the limits of the Desert of Gobi; while Major Montgomerie's Pundits are simultaneously working their way up from the south, and at every step as they advance lessening the extent of unknown country between British India on the one side, and the frontiers of Thibet and China on the other. The expedition, again, which will shortly march from Assam, to punish the recent raids of the Looshais, will add something, it is to

be hoped, to our knowledge, at present very defective, of the hilly country between the Brahmaputra and the Irawadi; while, in regard to Turkestan, the works which are now in the press, from the pens respectively of Mr. Shaw and Dr. Henderson, will form a most valuable supplement to Mr. Forsyth's account of his recent mission to Yarkand. In Persia, likewise, substantial progress is being made. A reconnaissance has been already effected, under Sir Frederick Goldsmid's orders, of the boundary line between the territories of Persia and Kelat, and Captain St. John is about to proceed from Tehran to Mekran, in order to lay down a regular map of this hitherto almost unvisited region. Sir Frederick Goldsmid himself having, with extraordinary ability, thus brought to a successful close his preliminary labour of persuading the Persian and Belooch authorities to accept of a fixed line of delimitation between their respective dominions, and having come home to report his proceedings in detail, is now returning to the East to exert the same good offices in arbitrating between the Persian and Affghan Governments; and as he is acompanied by Captain Lovett, of the Engineers, who made the previous survey in Mekran, we may expect, in the course of the ensuing spring, that not only will the province of Seistan be scientifically mapped, but the geography of all Eastern Persia will be accurately and fully determined. It is further probable, as the schemes for connecting Europe with India by a continuous line of railway acquire a more definite character, careful surveys will be instituted of many little known portions of the intermediate territory, which will greatly improve our maps of Asiatic Turkey and of Persia.

I may add, in respect to Syria, that our old medallist, Captain Burton, has recently explored a tract of country to the east of Damascus which had never before been visited by a European, and that he will read a paper on the subject at an early meeting of the Society. And, in concluding my notice of Asiatic discovery, I must congratulate geographers on the encouraging prospects of the Palestine Exploration Fund: Captain Stewart, of the Engineers, being about to leave England for the purpose of completing, during the next three years (and with the assistance of those experienced travellers and scholars, Messrs. Drake and Palmer), a survey of the whole of the Holy Land west of the Jordan, while the Americans have undertaken to execute a similar survey of the regions to the east of that famous river.

It remains that I should speak of Africa, the field hitherto of our noblest triumphs. It is surprising, and not a little disappointing, that up to the present time nothing should have been heard of the

progress of Sir Samuel Baker's expedition on the Upper Nile. I am in correspondence on the subject with our Consul-General in Egypt, and I learn from him that the Khedivé's Government does not manifest any anxiety as to the safety of the expedition; but it is a fact that since Sir Samuel Baker entered the reedy forests of the Bahr el Giraffe in the middle of last December, no intelligence whatever of his further movements had reached Khartum at the date of our last advices from Egypt.

With regard also to our other great African explorer, Dr. Livingstone, we are still kept in a state of the most painful suspense. We learn by the last reports from Dr. Kirk at Zanzibar, dated in the middle of August, that the Arab merchants with whom Dr. Livingstone had travelled from the south up to Manyemeh, had passed on from that place to Ujiji, and early in the month of June were daily expected at Unyanyembe. From Livingstone himself, however, no direct intelligence had recently reached Zanzibar, and it was only by inference that Dr. Kirk supposed him to be still at Manyemeh. The second batch of supplies intended for him had in the mean time passed on through Unyanyembe, "en route" to Ujiji, and Dr. Kirk was anxiously awaiting news of the arrival of the American traveller, Mr. Stanley, at that place. This gentleman, who is said to be of the true exploring type, left Bagamoyo on the coast for Ujiji in February last, and intended to communicate with Livingstone before proceeding further into the interior, so that we must receive before long, from this, if not from any other quarter, some definite intelligence of our great traveller's present condition and his plans for the future. Those who know Mr. Stanley personally are much impressed with his determined character and his aptitude for African travel. His expedition is well equipped, and he enjoys the great advantage of having secured the services of "Bombay," the well-known factotum of Speke and Grant. He is entirely dependent, I may add, on his own resources, and is actuated apparently by a mere love of adventure and discovery; and I need hardly say that if he succeeds in restoring Livingstone to us, or in assisting him to solve the great problem of the upper drainage into the Nile and Congo, he will be welcomed by this Society as heartily and as warmly as if he were an English explorer acting under our own immediate auspices.

In Southern Africa, also, Captain Elton has rendered valuable service to geography in following down the middle course of the Limpopo to the junction of the Lipalule, thence crossing to Lorenço Marques, in Delagoa Bay. The paper describing Captain Elton's exploratory journey down the river is considered of such import-

ance that the honour has been adjudged to it of being read at our opening meeting of this evening, and I recommend it accordingly to your best attention.

The only other subject that I have to notice is a very valuable paper which has also been submitted to us by Lieutenant Blakiston, and which describes his journey round the Island of Yesso. This island is of great interest to us, not only from its geological structure and its precarious political condition, but also from its having been the habitat of that remarkable race of hairy men, called the Ainos, regarding whom there has been so much discussion among physiologists. Lieutenant Blakiston is already favourably known to us from his pioneering expedition up the Yang-tse-kiang, and, as he travelled on this occasion in the capacity of an agent of the Japanese Government, he must have enjoyed unusual opportunities for observation. His paper will be read at an early meeting.

Captain Burton also, who is not less indefatigable as a writer than as a traveller, has promised us another Syrian paper on the Anti-Libanus, and may, perhaps, re-enter the lists in defence of his old opinions regarding the true Geography of the Lake Regions of Equatorial Africa.

The following paper was read:—

Journal of Exploration of the Limpopo River. By Captain Frederick Elton.

[Abstract.]

Captain Elton's expedition to explore the Limpopo River was undertaken for the purpose of opening up water-communication, and a more convenient route, from the settlement on the Tati River to the sea-coast, a distance of nearly a thousand miles by the road used at present, to Port Natal. A flat-bottomed boat, 13 feet long, with mast, sails, and oars, was constructed on the Tati; and Mr. Elton started, on July 6th, 1870, with the boat and baggage in a waggon, and three pack-oxen following. The first portion of the long journey was from the Tati to the point of embarkation on the Limpopo.

The country is here covered with a vast area of undulating bush, consisting chiefly of the thorny acacia, the mimosa, occasional fig-trees, and thorny underwood. The rivers are periodical, and run in broad, sandy beds, thickly fringed with reeds and rushes. Water-pools are few and far between in the inhospitable and thirsty tracts between the streams. Lions are numerous, and prowl about

the river-banks by night, in search of the game which they know must be forced, by thirst, into their clutches. Guinea-fowls, bush-pheasants, and partridges, troop down in the cool of the evening across the sands. The rhinoceros, buffalo, gnu, koodoo, zebra, and giraffe—hidden in the shade of the bush during the day—before daybreak, and at sundown, turn their heads towards the water. The elephant travels rapidly from one river to another, the constant war waged with him by the hunters keeping him nervously on the alert.

The inhabitants of this region belong to the Makalaka tribe. They have no cattle; goats and a few sheep compose their flocks, but as cultivators they are successful and hard-working. The castor-oil, millet, tobacco, and hemp are raised, and pumpkins are met with in the gardens near the kraals. In character the Makalaka is cunning, and horribly avaricious, cowardly in war, but daring in the chace, abjectly obedient to his chiefs, and from infancy impressed with the uselessness of resistance to the Matabele tribe, which is the conqueror of the Makalaka. The Makalaka huts and utensils are fairly and neatly finished.

After some annoying delays at the kraal of one of the chiefs, where it was necessary to leave the wagon, Capt. Elton continued his journey, the boat being carried on the shoulders of twenty men. The route followed the course of the Tuli River to its junction with the Shasha; and on the 30th of July the party encamped in the dry bed of the Shasha, at a distance of 100 yards from the Limpopo. This point is 175 miles in a direct line from the Tati settlement, and 258 miles by the route that Capt. Elton found it necessary to take.

The Limpopo is here a broad deep stream, about 200 yards across, fringed with large trees and thick underwood, where the first sight to greet the eyes of the travellers was a family of crocodiles, sleeping upon a small sand-island. At dawn, on the 1st of August, Capt. Elton began his voyage. Crocodiles were seen in numbers, and at one place a large herd of buffaloes broke from their covert in the reeds, and halted to watch the boat from the lower slope of the hills on the left bank. One or two large fish-eagles rose from the shadow of the cliffs, with shrill screams. An occasional cormorant, a few pairs of Egyptian geese, and graceful blue and white herons, lazily watched the approach of the boat; and, towards evening, large flocks of hornbills passed in their clumsy flight across the river. Where the hills receded, large tamarind figs, and a few baobabs towered over the thick foliage of the smaller trees, and the dense underbrush was interlaced with

coils of "monkey-rope," the resting-place of innumerable birds and their colonies of nests:—

> "The river trailing like a silver cord
> Through all, and curling lovely, both before
> And after, over the whole stretch of land."

On the 2nd, coming suddenly round a bend, the boat was driven down by the stream, and upset under the wide-spreading branches of a large tree, which, undermined by the current, had partially fallen into the water, remaining firmly attached to the banks by its curling roots. Capt. Elton lost his blankets, waterproof sheets, thick overcoat, and cooking utensils; and his store of sugar and tobacco was irreparably spoilt. The boat, bottom upwards, was brought up on a sandbank about half a mile lower down the river. On the 3rd the land party, with bullocks, was joined at a village called Mafelagure's.

The Limpopo, from the Shasha to this point is only obstructed by small rapids, and gradually increases in importance. A broad channel, with from 4 to 10 feet of water, can easily be followed, the prevailing direction being S.E.

The people at Mafelagure's are offshoots of the Makalaka tribe, and darker than the men on the Shasha and Tuli. They are armed with bows and arrows, quiet and inoffensive, and afraid of strangers. It was from these people that Capt. Elton first heard of the falls of the Limpopo, which they described as a "wall of water," and a desolate region where lions abounded and had driven out everybody, and where hippopotami and crocodiles were to be found in legions.

At about nine miles below Mafelagure's, the party came to a group of isolated conical hills on the right bank, and a little beyond this point a high range ran nearly parallel to the opposite shore. Rapids now became more frequent, and of a more formidable character, until a large river, running in from the north, was reached, called 'Mzinyani. Here the Limpopo, stretching out to more than a mile in width, rushes in a dozen different channels over large boulders, in seething and foaming rapids, interrupted by circling eddies and deep dark silent pools, the abode of hippopotami, who feed on the long waving grass of the thickly wooded islands—the surrounding reeds being honeycombed, in every direction, with the paths by which they travel on their nocturnal journeys. At a distance of five miles the river culminates in the cataracts of Tolo Azime.

The boat had been racing down with the current, and all Capt.

Elton's energies were directed towards running on shore. The trees on either bank of the channel, and the abrupt turns, entirely prevented any looking ahead; but the increasing roar of distant waters, gradually overcoming even the constant boiling of the rapids, was a danger-warning of ominous portent. At last they ran the boat safely into a creek under a large shelving rock, where they made fast, and scrambled through a sea of reeds and brushwood, in order to obtain a view of the situation.

Twenty yards' walk opened up a spectacle well calculated to make the whole party shudder at the peril they had so narrowly escaped. A magnificent fall dashed down into a yawning chasm right ahead of the channel where they had stopped the boat, and formed one of a succession of cataracts by which the river precipitates its waters through a vast rent in the land to a lower level. Torrents of pale-green water tore through the narrow passage beneath their feet, foaming and breaking in clouds of spray, over huge boulders, syenitic and micaceous rocks, intermixed with masses of a reddish-coloured granite, rising perpendicularly from the gorge, and overtopped by a sombre columnar wall of basalt, imprisoning the roaring flood between dark and lofty barriers.

Granitic and hornblendic rocks and boulders lie scattered broadcast, and in the wildest confusion, over all the barren land on the right bank, stretching away to a low line of hills in the distance, witnesses of the convulsions and upheavals to which the land has been subjected in order to form the "deep lateral gorges" through which the Limpopo descends from "the central plateau lands." The whole country from here takes one downward step, and descends to a lower level in a most striking manner.

In the foregoing sentences Capt. Elton quotes the very words of Sir Roderick Murchison, in the hypothesis on the physical structure of the African continent contained in our revered President's Address for 1852.

The position of Capt. Elton and his little party was not an enviable one. They stood on an island where their boat was of no assistance to them, and the sun was nearly down before they discovered a large fallen tree, lying over the head of a smaller fall higher up. Over this they passed, making themselves fast to the rope of the kedge which they took from the boat, and scrambling over the rocks of the smaller rapids beyond, until they reached their camp on the right bank at near midnight: a long day of feverish excitement.

In the morning they moved down below the falls, and spent two days in endeavouring to extricate the boat from its awkward position. No assistance was at hand. Mafelagure's people had

spoken truly—not a human being could be discovered. They succeeded, however, in carrying the boat to the foot of one of the higher falls, where it was swept down the chasm, the wreck finally lodging on a ledge of rocks, completely knocked to pieces, and of no further service. The *Freeman*, as the boat was named, was consequently abandoned—a most unfortunate loss.

Capt. Elton says that the beauty of the scenery round the Tolo Azime Fall cannot be exaggerated. Although much inferior, in point of size, to Niagara or to the falls of the Zambesi, the "combination of contrasts" afforded by the falls of the Limpopo, in their peculiar formation and surroundings, render them well worthy of a place in future African maps, and of sufficient interest and importance to repay the exertions of any future traveller whom curiosity may prompt to bend his steps in their direction.

Beyond the mouth of the 'Mzinyani, the Limpopo rushes in a dozen different channels, in seething and foaming rapids separated by islands. The channel on the extreme right bank continues its direction towards the south-east, boiling and sweeping over rocks and boulders, and is precipitated by a series of gradual and successive falls into a narrow gorge, where the volume of water is quickly increased by other channels seeking the same outlet. The gorge speedily increases in depth, and at last runs between perpendicular walls, principally composed of granite and basalt, 70 to 150 feet in height. Here the remaining branches of the river, inclining suddenly to the south, leap in a succession of parallel cascades into this abyss, thundering majestically into the chasm, and almost hidden by clouds of spray rising in white vapour from the torrent below, which foams and races down into a circular basin, surrounded by high escarped cliffs, and then, turning rapidly to the south, escapes in a deep narrow swift channel, on its journey towards the sea.

The large trees and the vivid colouring of the left bank, extending to the islands and to the very verge of the fall, is in marked contrast to the barren lands, sandy valleys, and scattered rocks on the other side, where, from the summit of the basaltic rocks overhanging the falls, a magnificent perspective is obtained. In front, and on a higher level, is the perpendicular barrier over which the river leaps into space; below thunder the waters into the chasm; far away to the left the gradual descent and commencement of the gorge is distinguished; while to the right abrupt and escarped rocks overshadow the circling depths of the basin, dense woods sloping gradually from its margin towards a blue range of distant hills.

Hippopotami abound both above and below the falls; koodoo, numerous monkeys and baboons, otters, and a few buffalo, were observed on the left bank; but on the right there were few signs of life, and the oxen had to be driven for some miles from the river-bank to find a few parched blades of grass.

No hunter has previously visited the Limpopo Falls, nor are they laid down on any map up to the present date.

At Tolo Azime the Upper Limpopo may be considered to terminate, and to debouch from the central plateau. The falls, of course, are an insurmountable obstacle to navigation; and indeed the rapids, for some distance higher up, had already condemned this river as unnavigable.

Capt. Elton continued his journey from the falls, on the 8th of August, with three pack-oxen and his four followers. On the 9th he encamped within a few miles of the last peak of a lofty range on the right bank—one of the spurs of the Zoutpansberg. On the 11th the party was opposite an immense extent of reeds visible on the left bank, probably the mouth of the Subischani River; and from here the Limpopo, which had been running free from obstacles, after a rapid bend, tore down in a narrow channel over a rocky bed, in a succession of rapids and falls, until, on the 12th, a rocky causeway was reached, constituting a second fall in the level of the river.

The scenery here was peculiarly wild and interesting. A large range of hills on the left bank formed the background, from which a thickly wooded country sloped down towards the river. Huge boulders of granite overtopped the network of rents through which the river dashed noisily down, either in shallow foaming rapids or in successive and miniature cascades. Great hornblendic rocks encumbered the whole stretch of the valley, pent in between the river and escarped hills. The progress of the oxen was impeded to such an extent that Capt. Elton began to despair of success, and to fear that he would be obliged to abandon any further descent of the Limpopo. The wildness of the scene was increased by a group of lions, which continued to fight over the carcase of a zebra, without paying the least attention to the travellers.

That evening they were compelled to ford the river, breast high in places, to the left bank; the small path they had hitherto been following being cut off by a considerable range of hills rising abruptly from the water's edge. The river was now running between parallel ranges of escarped hills, in rapids and small falls, boiling and foaming through shallow passages and around islands.

They had met with no human beings since they left Mafelagure's.

kraal, but on the evening of the 13th they arrived at Amabaga's kraal, where they met with a hospitable reception. This is another of the nondescript villages met with on the Limpopo—a composition of people from surrounding tribes, the Makalaka element predominating. They have no flocks, but depend for flesh on the chase, while the low alluvial lands abutting on the river yield them large crops of *holcus*, the surplus of which is converted into beer, and its consumption seems to form the principal aim of their existence.

Beyond this village the hills rise precipitously on either bank of the river, and the travellers passed the greater part of the 15th in the water. They crossed and re-crossed *nine* times during that one day.

After the last crossing they surprised a *Knobnuizen*—a wretched specimen of humanity, and a living testimony in favour of the Darwinian theory—without a vestige of clothing, tattoed with a line of knobs bearing a striking resemblance to nuts, extending from the roots of his wool perpendicularly down the forehead to the end of the nose. These unfortunate people inhabit small huts hidden away in the bush, and live by their bows and arrows or upon edible roots. Intensely black in colour, with exaggerated everted lips, they bear on their persons all the outward signs of want, abasement, and degradation. They are of inferior stature, small limbed, with large hands and feet, pot-bellied and spindle-shanked. Starvation continually stares them in the face, and their life is one constant battle for existence.

After a somewhat dangerous encounter with some warriors of Umseila's tribe, the party, stumbling through high reeds and wet grass up to their shoulders, reached a large kraal of Maloios, where they were well treated, and where they procured a guide who took them to the junction of the Limpopo with a river called Nuanetzi. Here many kraals are met with, and there is a fertile country, bounded by a distant range of sandstone hills, and extending between the Leviebu and down the Limpopo, to some distance below the Nuanetzi. It is peopled by Maloios, an offshoot of the extensive Amatonga family, paying tribute to Umseila. Their kraals are neat, well built, and shaded by trees, in marked contrast to the custom of the Zulu tribes, who cut down every tree near their villages with scrupulous care.

The journey from the confluence of the Nuanetzi, down the Limpopo, to the Lipalule River, occupied ten days, from the 19th to the 29th of August, following the right bank. The land is composed of a rich fertile soil, and is sufficiently raised above the

level of the river to guard against fever and sudden inundations. Wild cotton is very abundant and of singularly good quality, growing frequently in bushes 8 or 10 feet high. On the 21st and 22nd the left bank was hemmed in by a succession of escarped mountains, the road lying over low broad hills and undulating flats of forest land. Here the Limpopo flows in a deep and open channel.

Further on they descended into open rich grass lands, covered with large trees, through which the river winds majestically in an uninterrupted course far away into the distance—a splendid landscape, fresh, green, and enlivened with the most vivid tints. On the 29th, through a continuation of this park-like country, they marched into a rich district stretching away to the banks of the Lipalule, thickly peopled by Amatonga, under the government of Madumelan, who commands the Limpopo from the junction of the Lipalule, and collects the tribute paid by the kraals between the two great rivers—the Limpopo and the Uncomogazi (King George's River). The land is highly cultivated—sesame, *holcus*, tobacco, castor-oil, hemp, and ground-nuts being raised in great quantities.

The Limpopo, from the Nuanetzi to the Lipalule, will afford a navigable channel even in the driest season of the year; and it would be quite practicable to use the river as a way of water-communication, cargoes being towed in flats by steamers with a light draught of water. The right bank presents great facilities for the construction of a road, and the district being rich and alluvial, it would, if colonized by Europeans, rapidly become a fertile and important centre, monopolising a considerable trade with the interior, and connecting with the Transvaal by two routes, the one by the Luribu and Zoutpansberg, the other by the Lipalule.

The dreaded *tsetse* was seen on the 19th and 20th of August, and although Capt. Elton's oxen were bitten, none of them experienced any bad effects. He believes that the danger of the bite of the *tsete* has been exaggerated. The natives do not believe it to be universally fatal, unless the animal bitten is in low condition, and exposed suddenly to heavy rains. A strong, healthy animal runs little or no danger.

Game of every description abounds on this part of the Limpopo's course; buffalo, elephants, rhinoceros, giraffe, waterbuck, gnu, zebra, eland, koodoo, wild boar, the striped hyæna, wild dogs, leopards, and lions; while large dragon-flies and brilliant butterflies are seen in the vicinity of water. Cormorants and fish-eagles

poach the rivers; and there are white-necked ravens, hornbills, green pigeons, paroquets, vultures, hawks, white herons, partridges, numerous waterfowl, and an infinite variety of small birds with gorgeous and striking plumage.

The baobab is constantly met with, and, from the enormous bulk which some of the trees have attained, they must date back for many centuries. Euphorbiæ, four varieties of fig-tree—one of which reaches a large size, the graceful tamarind, acacias, mimosas, the dwarf date-palm, are the most prominent components of the wood-lands. The pale-blue lotus is not uncommon, and reeds and bulrushes border the water's edge in many places. The banks are fringed with waving feathery-topped grass, while prickly pears, aloes, and cacti form the dense under-thicket. Hanging lianas, formidable hook-thorns, and labyrinthine monkey-rope, choke up the "beast-paths;" and a magnificent yellow creeper, convolvuli, and various parasitical plants, either entwine the gnarled trunks of the larger trees or are to be seen fixed between the branches. The district is well drained by deep ravines, and appears to be dry and healthy.

From this point (the junction of the Lipalule with the Limpopo) Mr. St. Vincent Erskine had already traced the latter river to the sea. As Capt. Elton, single-handed and without a boat, could make no practical survey of the lower waters and the bar, he determined to strike across the Lipalule, cross the Uncomogazi, and so reach Delagoa Bay, where there is a Portuguese settlement called Lorenço Marques.

On the opposite bank of the Lipalule the party struck through a dense bush country, in order to reach a path leading to the Uncomogazi. They halted, after walking all day, by a small pool, where elephants and a large herd of buffalo came down to drink. The next day, the 31st, they still travelled through the same monotonous jungle, meeting giraffe, gnu, and zebras on their way, and at last found the path. On the 3rd they came to a number of Amatonga villages, near a lake communicating with the Uncomogazi. Capt. Elton went down to the lake, and got within shot of a large bull hippopotamus, with his head and shoulders out of the water, yawning and clashing his jaws together. A ten-to-the-pound bullet, and six drachms of fine powder through his neck, finished him; and in his dying struggles he crossed the lake into shallow water, pursued by four or five of his companions, who hunted him about, and attacked him fiercely, the water all around being white with foam, one of the most exciting scenes possible. When he was fairly dead they left him, and the Amatonga people

were delighted at seeing his huge barrel-shaped carcase lying on the shoal.

The ferry across the Uncomogazi is farmed to a small chief on the river, who drove a terribly hard bargain with the travellers. Capt. Elton gave him the last piece of cloth, the last knife, and the last string of beads he possessed; and then was obliged to add ten bullets, half the last canister of powder, and his own pocket handkerchief, before the usurious ferryman would embark the party. The ferry-boat was hollowed out of the trunk of an immense tree, and carried the baggage and eight men with ease, in addition to two Amatonga men who managed the navigation. From this ferry to the sea the natives call it three days' journey, and here this magnificent river is running in a navigable channel of deep water for almost its entire breadth of about 600 yards. Yet, although it falls into Delagoa Bay, almost within sight of Lorenço Marques, the Portuguese absolutely turn it to no account. The river is known by various names,—among them the Uncomogazi and King George's River,—and it has been curiously confused with the Limpopo by former geographers.

It fell to the perseverance and good fortune of Mr. St. Vincent Erskine to carry down the Limpopo from the affluence of the Lipalule to the sea, and prove it to be the river laid down on Captain Owen's chart as the Inhampura; and he also traced the upper waters of the Uncomogazi.

Turning their backs on the latter river, Capt. Elton and his party passed through a thickly wooded grass country, where lions gave them some trouble during the night; and on the 7th of September, in pouring rain, they arrived at the gates of Lorenço Marques, where the sentry appeared to have some scruples in admitting a party headed by a white man, dressed in an old leathern kilt and gaiters, considerably travel-stained, and rather excusably over-excited at his safe arrival at the sea-board.

The main part of the country travelled over from the Lipalule presents an arenaceous aspect, and consists of a succession of easy undulations and rounded sandstone hills, traversed by protrusions of trap. On the rivers, a soil rich in vegetable matter, and capable of constant irrigation, richly repays the agricultural labours of the Amatonga, who raise large crops of millet, rice, sesame, ground-nuts, pumpkins, castor-oil, and Indian hemps, as well as bananas, oranges, limes, onions, and cabbages. The ridges, running parallel to King George's River, and extending to the heights commanding Lorenço Marques, are bounded by dead flats, and between the vast sea of reeds fringing the river's banks and these bluffs lies a strip

of peculiarly rich soil, admirably adapted for the cultivation of cotton, and which at present yields to the natives extraordinary returns in *holcus* and maize.

The principal trade at Lorenço Marques is in the hands of a French house, and of the Banyans from Diu. The town is built on a whale-backed sand-flat, nearly surrounded by water at low tide, and is entirely commanded by the neighbouring heights, from which the Portuguese have been threatened by the natives from time to time, with comparative impunity. The town is surrounded by a wall, and defended by three bastions fronting the land, and a bastion at each extreme angle. The feeble garrison consists of 120 soldiers, and 16 useless old honeycombed guns. A half-ruined fort, a *place d'armes*, around which the best houses and the custom-house are built, and three parallel streets connected by narrow lanes, compose the town of Lorenço Marques. Banyans, half-castes from India, a few Europeans, negro soldiers, and a large number of slaves, constitute the population. Capt. Elton ascribes the decayed condition of the Portuguese possessions on the east coast of Africa to the incessant intrigue and the evil passions aroused by the ancient slave-trade, to the apathy and incapacity of preceding governments, and to a general dearth of money.

The entire country, from the Lipalule to Delagoa Bay, is inhabited by Amatonga, and by the men of Umseila, who is the paramount ruler of the region extending from the Uncomogazi to the Busi.

The distance, in a direct line, from the Tati settlement to the confluence of the Shasha and Limpopo is 175 miles, thence to the Limpopo falls 60, thence to the Nuenetzi 119, from the Nuenetzi to the Lipalule 110, and from the Lipalule to Lorenço Marques 165. The total direct distance of the five divisions of the journey combined is thus 629, and Capt. Elton estimates the distance actually travelled over at 964 miles in 52 marching days. He says that, with six months' preparation, he will undertake to run steamers and flats to the Nuenetzi in fifteen days, and connect with a wagon road, by way of Zoutpansberg, to the Tati, a journey which should be made easily in fifteen more, or thirty days in all. He believes that the unhealthiness of the Limpopo and the coast has been greatly exaggerated.

The paper will be printed entire, with the author's map, in the 'Journal,' vol. xlii.

Sir Bartle Frere said it might be of interest to note the remarkable illustration afforded by the paper of the truthfulness of a very nearly forgotten romance by Defoe, 'The Adventures of Captain Singleton.' Captain Singleton

is described in the book as having been a buccaneer or filibuster in the days of James II., who, after acting as a pirate for some years in the Indian Seas, was at length wrecked on the coast of Madagascar. With the help of the surviving crew he built a boat and made his way to the African coast, whence he proceeded through a country which might very well be described in the words of Captain Elton's Journal, or in the terms which Dr. Livingstone used in speaking of the country between the Zambesi falls and the sea. They went through a rich, alluvial, tropical country, until they came to a steep wall, up which they had to climb to the top of the falls which they found interrupting the course of the great river which they had followed from the coast. They then got on to a sandy region, where they were very much pestered by the lions and other wild animals, and suffered greatly from want of water. After many days' journeying they at length made their way to the Portuguese settlements on the west coast of Africa. The interest of this romance lay in this, that there was ground for supposing that De Foe never wrote one of his novels without some substratum of fact he had gathered from the stories he had heard from voyagers and travellers whom he met at the taverns about London. It was a very curious fact, that the description of the country in this almost forgotten story might seem to be taken from the accounts given by Sir Roderick Murchison from the narratives of men like Livingstone and the traveller whose journal had just been read.

Mr. Francis Galton said, twenty-five years ago the map of the country about the Limpopo was nearly a blank, and, he might add, that perhaps the most appropriate memorial of the geographical labours of Sir Roderick Murchison would be two maps, one representing the world as known at the time when he first interested himself actively in the affairs of the Society, and the other representing the world as known at the present time; for in the twenty-five or thirty years that had elapsed between those two periods, the progress of geography had been immense. In the Arctic regions, in Africa, north and south, in Australia, in all parts of the world, explorations of the highest importance had taken place, and every exploration met with his heartfelt sympathy, in many cases with his guidance, and in some with his initiation. Previous to 1848, the limit of African travellers, proceeding from the south, was a dry, arid country, in the neighbourhood of Livingstone's first missionary station, not far from which the Limpopo perennially flowed, no one knew where, to the northward. It was the old story of African rivers over again,—the case of the Niger on a small scale,—that is, of a large river flowing in a direction that was not seaward. Since then, various travels had been made in the interior of Southern Africa, and a great portion of its interior had become known; but now, for the first time, complete information was obtained concerning the course of the Limpopo. The nature of its course threw great light on the general features of the geography of Africa. The Limpopo makes a curve concentric with the lower course of the Zambesi, and mimics it in many ways, showing the similarity of the physical features of the banks of the two rivers. It has also its great fall; and the position of that fall, as laid down by Captain Elton, gives very fairly the boundary line of the great African plateau in which so many rivers have their rise.

Admiral Hall said the entrance to the Limpopo was very insignificant, and he was glad to hear such a good account of the interior. It was his good fortune to command the *Nemesis*, the first iron steamer that ever rounded the Cape of Good Hope. He left the Cape in the dead of winter, and off Algoa Bay encountered a tremendous gale. At last, fortunately, he reached Delagoa Bay, where he found smooth water and let go the anchor. He stayed there three weeks, and tried to get up the Limpopo, but only succeeded in doing so for a short distance, though he met with hippopotami, zebras, and all sorts of game. The great want of English vessels going round the Cape was a good

harbour, there being none such between Simon's Bay and Delagoa Bay: he therefore recommended that England should extend her South African possessions to that bay.

Mr. SAUNDERS asked if Captain Elton in his Journal had given the altitudes of the range through which the Limpopo breaks in its course to the sea.

Mr. CLEMENTS MARKHAM said Captain Elton appeared to have lost everything when his boat capsized in the upper part of the river, so that he made no observations for height.

The PRESIDENT said the information afforded by Captain Elton's Journal formed a great stride in geographical knowledge. The curious parallel which Sir Bartle Frere had discovered between the journey of Captain Singleton and that of Captain Elton must have arisen from knowledge which Defoe picked up in conversation with Portuguese travellers, who, no doubt, in those days had passed from the east to the west coast of Africa. He quite appreciated Admiral Hall's sailor-like wish that England should extend her coast and get a good harbour; but he was afraid this was hardly consistent with a due regard to international considerations, as Delagoa Bay happened to be in the possession of our old and intimate allies the Portuguese. It was a curious fact that all the rivers on the east coast of Africa, however large they might be in the interior, were almost lost at their embouchures; some of them actually had no mouth, there being sandbanks across the entrance. The Zambesi had a bar across the mouth, and the Limpopo and the Lorenço Marques were so small at their entrances that boats could hardly enter them. A paper had recently been submitted to the Society by Dr. Mann on this very subject. In conclusion, he asked the Society to record their thanks to Captain Elton for his very interesting paper.

Mr. GEORGE FRERE wished to inform the Meeting that the English claimed the east coast of Africa up to latitude 26°. He recollected one of our admirals stationing a party of men on Inyak Island, which lies in the bay, within that limit, in assertion of the claim. The place had the reputation of being a wretched hole, which might account for some apparent indifference about it, but its importance had not been lost sight of in the proper quarter.

Second Meeting, November 27th, 1871.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Lieutenant William de Wiveleslie Abney*, R.E.; *Hon. J. F. Birch*; *Charles de la Barre Bodenham*; *Captain Alexander Bowers*; *Samuel Constantine Burke*; *Lieutenant Reginald Chalmer*, 60th Royal Rifles; *Arthur Cockshott*, M.A.; *Lieutenant Gustavus W. Berry Collis*, 6th Royal Regiment; *Rev. James W. Cook*; *Charles Cowper*, C.M.G.; *Henry Augustus Cowper*; *William Campbell Eyton*; *James Murray Foster*; *Captain John Clinton Greene*, R.A.; *Edgar Christmas Harvie*; *George F. Head*; *Dr. Henderson*; *Henry Tylston Hodgson*; *Rev. James John Hornby*, D.D., Head Master of Eton College; *Captain Alexander Hadden Hutchinson*, R.A.; *Thomas Hughes Jackson*; *T. Johnston*; *Robert Jones*; *Edgar John David Ludlow*; *Henry Major*, B.A.; *Baron de Maltzan*; *Edward Ellis Morris*; *H. W. Mozley*, M.A.;

James William Paterson, B.A.; *Edward P. Philpott*, M.D., LL.D.; *Lieut.-Colonel Charles Rowley Platt*; *Robert Reid*, B.A., F.Z.S.; *James Shoolbred*; *Henry Slade*, Surgeon R.N.; *Major C. B. Euan Smith*; *Albert Stephani*, Knight of Bederkesa, LL.D., PH.D., Secretary to the Chamber of Commerce and Industry for Silesia; *Captain Herbert Stewart*, 37th Regiment; *W. P. Sutton*, F.S.A., &c.; *Lieut.-Colonel the Hon. Charles Smyth Vereker*; *Robert Watt*, C.E.; *Joseph Wiggins*.

Accessions to the Library from Nov. 13th to Nov 27th, 1871. 'Ollanta; an Ancient Inca Drama.' Translated from the original Quichua by C. R. Markham, C.B. 1871. Donor the author. 'Due mesé di escursione alle Coste Belgiche,' etc. By Comm. Cristoforo Negri. Firenze, 1871. Donor the author. 'Notes on Chinese Literature.' By A. Wylie. Shanghae, 1867; and 'The Chinese Recorder.' By S. L. Baldwin, in Foochow. Donor H. E. Hollingworth, Esq. 'Papers on the Eastern and Northern Extensions of the Gulf Stream.' From the German of Petermann, Freeden and Mühry. By Captain R. H. Wyman and E. R. Knorr. Washington, 1871. Donor the author. 'Bloemlezing uit Maleische Geschriften.' By G. K. Niemann. 1871. Donor the author.

Accessions to Map-Room since the last Meeting of November 13th, 1871.—Chinese Map of China in 32 parts, published in 1862. By King-Hang-Low, Acting Governor of Hoo-peh. Topography of China and neighbouring States, with Table of Geographical Positions. Map of the New Course of the Yellow River, on 4 sheets. By Ney Elias, jun., F.R.G.S. All the above presented by H. G. Hollingworth, Esq. Map of Thessaly, on 2 sheets. By H. Kiepert. Presented by the author. Map of Turkey in Europe, on 4 sheets, by H. Kiepert. Presented by the author. Government Survey of India, 5 quarter sheets, viz., 1, N.E.—1*a*, S.E.—8, S.W.—8, S.E.—125, S.W. Presented by Her Majesty's Secretary of State for India. Forest Map of Mysore. Presented by Her Majesty's Secretary of State for India. Map of Australia, on 8 sheets. By Dr. A. Petermann.

The President, after a few prefatory remarks, read the following letters from Dr. Kirk to the late Sir Roderick Murchison and to the Foreign Office, regarding Dr. Livingstone:—

"Dear Sir Roderick, "Zanzibar, 25th Sept., 1871.

"You will see, by the account sent to the Foreign Office, that difficulties have sprung up in Unyamwezi and cut off Ujiji from the coast; and as it happens no Ujiji news has been received for some time back, we may be a long time in getting any certainty of Dr. Livingstone's movements.

"All I can say is, that I lack reports from that place: neither he nor his Arab friend Mohamed bin Gharib had arrived; but there was a story, which I

think worthless, to the effect that they were both to go round the south end by way of Wemba.

"I can yet get no correct account of Manyema: every one knows it, but I find no one who has been there. I have seen people who have crossed the Tanganyika from Ujiji, and seen the Manyema caravans setting out, but it seems to be rather a new and special line of trade.

"I am glad that the governor of Unyanyembe is to be removed: he is the one on whom the war there is laid, and if he had been killed we should all have been better satisfied.

"Mr. Stanley was at Unyanyembe and in the fight, but the Arabs abandoned him; four of his men were killed, but he escaped. His prospect of getting on is at present small, but I really cannot say where he desires to go to; he never disclosed his plans here. I sent up letters for Dr. Livingstone under his care, and put also the things (of the second lot, the first has reached Ujiji) for Livingstone into his hands.

"I fancy he will make a point of meeting Livingstone first; but whether, having seen what is best to do, he will push on or come back, I cannot say. He was ill of fever when he wrote, but has got tolerably well.

"The men who came down return to-morrow, and ought to be there in twenty-five days, for the road is fine, and grass and food plenty.

"Believe me, dear Sir Roderick, yours most sincerely,

"JOHN KIRK."

"MY LORD, "Zanzibar, 22nd Sept., 1871.

"Letters just received by special messengers, who left Unyanyembe about a month ago, inform us of a sad disaster that has befallen the Arab settlement there, and that will in all likelihood stop the road to Ujiji and Karague for some time to come.

"All accounts agree as to the main facts; but naturally the letters written by Mr. Stanley, an American gentleman, who was on the spot, are the most circumstantial and reliable. I am indebted to Mr. Webb, the American Consul here, for some details related in those letters, which will, no doubt, be published in full elsewhere. Briefly the position is this—the Arab colony of the interior, whose centre is Unyanyembe, has for some time been led by a set of avaricious unprincipled men, whose acts of extortion, both on natives and the poorer Arabs, have for some time back been complained of to Seyd Burgash, who is impotent to interfere at such a distance, so long as things go well for the Arabs. A chief, whose village was one day's journey distance on the main road to Ujiji and Karague, fell under the displeasure of the Unyanyembe settlers, and his place was attacked in due course by a force of about 1500 muskets. Seeing that he could not hold the blockaded village, he retired with his followers, and formed an ambush for the return of the attacking party, when laden with ivory and other booty. The result was disastrous to the Arabs, and a great many were killed, including ten or twenty of the leaders, men of good family here. The Arab retreat soon became a rout, and much property was lost. Fortunately Mr. Stanley, who was weak and ill from fever, managed to return to Unyanyembe, but he was abandoned by the Arabs, whose conduct he speaks of as cowardly in the extreme.

"Such is the constant state of things in Central Africa. The road to Ujiji will now be shut for a time, and when we may again hear of Dr. Livingstone is most uncertain. One of the men who came down now says, that there was a rumour that Mahomed bin Gharib and the white man (Dr. Livingstone) would come back from Manyema by way of Marungu and Wemba. The report is worth nothing, I consider, but I may as well mention it.

The last lot of things sent by Mr. Churchill had reached Unyanyembe, as I have before reported; but I now learn that the head-man, in whose charge

they were, died the day after setting out for Ujiji, and the goods were brought back to Unyanyembe. I have little faith now in the Sheikh Saeed bin Salim, and shall write to Mr. Stanley, who will probably not have been able as yet to quit the place, and authorize him to make such arrangements as he can to get the goods forwarded, or, if not, to act for me to the best of his judgment in protecting them from plunder; but in such a state of things as this, it will be most fortunate if they have escaped, and ever reach their destination.

"The messengers will start on their return in a day or two, and should be able to accomplish the journey easily in seventy or seventy-five days, for the way so far is open and food plenty.

"To the Arab ivory trade the present position of affairs is most serious; they have now settled far up in the country, and collected about them thousands of slaves drawn from the country itself: these they cannot do without, and yet cannot trust; they are all armed, and may turn against their masters.

"The chief with whom they are at war is well provided with arms, and a caravan of his is now on the way up with several hundred kegs of powder, to stop these people on the way. The Wasagara have been told already to attack and plunder them; but this, too, may be but the beginning of similar attacks on Arab caravans, for the wild tribes, when once plunder has been encouraged, will care little whom they attack.

"I have, &c.,
"John Kirk,
"Acting Political Agent and Consul for Zanzibar.

"*Earl Granville.*"

Captain R. F. Burton said this was not the first time that disturbances had broken out between the Arab trading communities and the natives of Unyanyembe and Unyamwezi. The present state of things might continue for two or three years; but if Livingstone wished to avoid passing through that district there would be no difficulty in his returning by the south of Lake Tanganyika. At the same time, a white man like Livingstone, fearless, and speaking the native languages, would be able safely to pass through places in which no black man dare venture. He had not the slightest fear with regard to Livingstone. He was convinced that the moment anything happened to him the news would rapidly spread to the coast, and the Society would hear of it almost as if it came by telegraph.

The following Papers were then read :—

I.—*Notes on an Exploration of the Tulúl el Safá, the Volcanic Region east of Damascus, and the Umm Nirán Cave.* By Captain R. F. Burton, Medallist R.G.S.

[Abridgment.]

On Wednesday, May 24, 1871, we—that is to say, Mr. Charles F. Tyrwhitt Drake and I—left Damascus, intending to commence a tour through the Hauran Mountain (Jebel Durúz Haurán) by an exploration of the Tulúl el Safá. Little need be said concerning our first eight days of travelling over a well-worn line, except that we found the mountain, like Syria and Palestine generally, explored as to the surface in certain well-worn lines, and elsewhere absolutely

unknown. My friend's map of the tour will be a considerable addition to our scanty geographical knowledge of the Trachonitis.

We sketched during that week some 120 inscriptions, including three in the Palmyran dialect. We also dug under the tower of Bassos at Shakkah, the Saccæa of Ptolemy, and we found that here, as at Palmyra, the dead were mummified. Three long inscriptions, in Greek hexameters and pentameters, give all possible information about Bassos, and the date of his death is generally placed in A.D. 176. On Friday, May 26, we ascended the quaintly fashioned tumulus of clay, or rather indurated mud, sprinkled over with scoriæ, which the people call Tell Shayhán, from the holy man whose tomb crowns the summit. The importance of this feature has been greatly under-estimated in all our maps. A view from the south-west, where it appears a huge legless arm-chair, at once shows that the Leja or Refuge, the Argob of the Hebrews and the Western Trachon of the Greeks and Romans, is mostly the gift of the Tell Shayhán. It is, in fact, a lava-bed, a stone torrent poured out by this volcano over the ruddy-yellow clay and the limestone floor of the Hauran Valley, whilst in later ages the surface has been modified by the action of the elements. Dr. Wetzstein rightly defines the limits of the pyriform "Mal Paiz," placing "Brák" town (Burák or the Cisterns) on the north at the stalk of the pear, Umm el Zaytún on the east, Zora (Dar'ah) at the westernmost edge, and Ri'mat el Lohf to the south. But he feeds the Leja with a "grosser lavastrom," proceeding in an artificially straight line from Jebel Kulayb, and flowing from south-east to north-west. We ascertained, by careful inspection, that this feature does not exist. At Kanawát, the ancient Kenath and Canatha, Mr. C. F. Tyrwhitt Drake secured the fine altar-head of basalt now lying in the rooms of the Anthropological Institute. At the noble ruins of Si'a were found two Palmyran inscriptions, showing that the Palmyrene of Ptolemy extended to the south-west, far beyond the limits usually assigned to it by the moderns. We then ascended the Kulayb for the purpose of mapping the tops of many craters which appeared to be scattered in confusion. Viewed from the height of the Libanus, the Anti-Libanus, and the Haurán, this mountain appears like a dwarf pyramid, studding the crest of a lumpy blue wall, and it is popularly supposed to be the apex of the range which palæographers have identified with the Ptolomeian "Alsadamus Mons."* The name is erroneously written Kulayb, meaning "little dog," and is mispro-

* See, however, Dr. Wetzstein (p. 90). I avoid making extracts from his excellent 'Reisebericht,' and my leisure moments are employed in translating and annotating it.

nounced Kulayyib. The orthography is Kulayb, "little heart," or "turning point," and the latter is doubtless the correct sense, as the central ridge of the Jebel Haurán here drops southwards into an upland valley. On a nearer view El Kulayb has one peculiarity: where all the cones are barren heaps of red and yellow matter, it is feathered with trees up to the summit. A little south of the apex we found a diminutive crater opening eastwards. The aneroid showed 4·18° lower than the summit of the Cedar Block, the greatest altitude in Syria and Palestine; the B.P. 205·50° (temp. 75°), and the hygrometer supplied by M. Casella stood at 0°.

The summit of El Kulayb gave us two valuable observations. The apparently confused scatter of volcanic and cratered hill and hillock fell into an organized trend of 356° to 176°, or nearly north and south. The same phenomenon was afterwards noticed in the Safá Region, and in its outliers, the Tulúl el Safá, which lie hard upon a meridian. Thus the third or easternmost great range separating the Mediterranean from the Euphrates Desert, does not run parallel with its neighbours the Anti-Libanus and the Libanus, which are disposed north-east and south-west.

The second point of importance is that the "Turning-point Mountain" is not the apex of the Jebel Durúz Haurán. To the east appeared a broken range whose several heights, beginning from the north, were:—

1. Tell Ijánah bearing 38°, and so called from its village. Though not found in Dr. Wetzstein's map, it is rendered remarkable by a heap of ruins, looking from afar like a cairn, and it is backed by the Umm Haurán hill bearing 94°.

2. The Tell, rock and fountain of Akriba (Dr. Wetzstein's Akraba), bearing 112° 30′.

3. Tell Rubáh, bearing 119°; and

4. Tell Jafneh, a table-mountain with a cairn at the end, bearing 127° 30′.

During the course of the day we passed between Nos. 1 and 4, and we assured ourselves that our observation with a pocket goniometer and spirit-level, taken from the summit of El Kulayb, was not far wrong in assigning 300 feet of greater altitude to Tell Ijánah. But though the "Turning-point Mountain" is not the apex of the Haurán highlands, it conceals the greater elevation from those standing either upon the crest of the Hermon, or in any part of the Auranitis Valley.

A visit to the eastern settlements facing the Euphrates Desert convinced us that the Jebel Durúz Haurán has greatly changed since it was described by travellers and tourists. Until the last

150 years it was wholly in the hands of the Bedawin; at that time it began to be occupied by the Druzes, whom poverty and oppression drove from their original seats in the Wady Taym and upon the slopes of the Libanus and the Hermon. During the last five years not less than seventeen villages have been repeopled, and in the autumn of 1866 some 700 or 800 families fled to this safe retreat. We can hardly wonder at the exodus, when we are told that nearly half the villages of the Jaydúr district, the ancient Iturœa, eleven out of twenty-four, have been within twelve months ruined by the usurer and the tax-gatherer. It is hardly necessary to dwell upon the short-sighted policy which drives an industrious peasantry from its hearths and homes to distant settlements, where defence is much more easy than offence; and where, as Cromwell said of Pease Burn, "ten men to hinder are better than a hundred to make their way."

On the evening of Wednesday (May 31st) we reached Shakkah, the ancient Saccœa, still showing extensive ruins and sundry fine specimens of Hauranic architecture, especially the house of Shaykh Hasan 'Brahim, with its coped windows and its sunken court. Here we were received by the Druze chief, Kabalán el Kala'áni. This person had met us at Kanawát, and had promised an escort to Umm Nírán. He now warned us that his people were on bad terms with the Ghiyás Bedawin, who were in their summer quarters, the Ruhbah Valley, distant only about 15 geographical miles from the cave. Presently we found out that his only object was to urge an exorbitant demand for some ten horsemen—a less number would fear to travel. We at once determined to make our *point de départ* the little village of Taymá, lying about 8 miles to the south-east. It was out of our way, but the Shaykh Yusuf Sharaf had shown himself our friend. In justice to the Druzes I must remark that Kabalán el Kala'áni was the sole base exception to the hospitality of his race, and to the national affection with which they regard their old friends and allies the English. And as a proof that his conduct was generally reprobated, six youths, the sons of Shaykhs, or chiefs, at once volunteered to escort us, and refused all remuneration.

Our first step was to dismiss all the *bouches inutiles;* the next was to secure a Bedawi guide, and two camels for carrying grain and water. Our own little party thus consisted of Mr. C. F. Tyrwhitt Drake, myself, and a single attendant—Habíb Jemayyil, a Syrian youth of good family, from about Bayrut, who had, during a year and a half, more than once proved his pluck. We had a poor chance against 200 or 300 Bedawin, a force which the bandits can

always muster, and the value of the mares mounted by our escort suggested that their tactics would be the Parthian, without firing *à tergo*. Still the offer was intended as an act of civility, and we could not refuse it without seeming ungracious.

Despite the stiff scirocco, which blurred the outlines of the distant highlands, before beautifully crisp and clear, we left Taymá at 1.50 P.M., on Friday, June 2nd. The bridle-path led past sundry small villages of Druzes to the well-defined Wady Jahjáh, which after rain discharges eastward into the basaltic outcrop, known as El Harrah, the "hot" or "burnt land." One hour's ride over rough but not difficult ground placed us at the Krá'a, which is simply a lava-torrent, showing volcanic dykes, secondary craters, and blow-holes, with barrows arbitrarily disposed at all angles. The two normal forms, the long barrow and the round barrow, are sketched by Dr. Wetzstein (p. 13). He considers them to be big bubbles, whose reticulated surface is almost invariably blown off at the top, or split along the ridge, by the bursting of the gases which elevated them. In some cases, however, the narrowness and sharpness of the gashes at the summits, and of the clefts which divide the lengths, seem to argue that the mere contraction of the cooling mass is sufficient to part and split it; moreover, not a few have cross cracks as well as longitudinal fissures.

Evidently the basaltic formation of the Trachons is of younger date than that of the Hermon. An active volcano presupposes the neighbourhood of the sea or of some large lake. This outbreak probably belongs to the days when the Eastern Desert—a flat stoneless tract extending from the Trachonitis to the Euphrates—was a mighty inlet of the Indian Ocean. The northern limit of this extinct Mediterranean may be found in the range of limestones and sandstones, the furthest outliers of the anti-Libanus, upon whose southern and eastern part Palmyra is built, and which runs *viâ* Sukhneh eastward to the actual valley of the Great River. At the river known as Kasr el Hayr, in the Jayrud-Palmyra Valley, I found the stone composed mainly of scallops or pectines so loosely agglutinated that the fingers could pick them out.

We crossed the K'rá'a in 55 minutes, and entered the Naka', rolling ground of loose ruddy-yellow soil, the detritus of basalt which, during wet weather, balls the feet so as to prevent walking, and in which, during the dry season, horses sink up to the fetlock. This is the staple material of the Haurán. Our passage of the Naka' occupied two hours. We then ascended a hill-brow, which in Spain would be termed a "Loma," and fell into El Hazm: the only difference in the aspect of the land was a trifle more of stone, whilst the

basalt was either lamp-black or snow-white with the usual cryptogam. These people borrow from the Bedawin a name for every modification of terrain, however trifling. The lands to the north —a mixture of clayey soil and stone—are called El Hármiyyah; the stony ground to the east is the Wa'ar, the usual generic term; and still on our right ran the rocky Wady el K'rá'a, which we had crossed and left southwards.

Here we had our first fair view of the Safá. The little volcanic block, with its seven main summits, is well laid down in outline by Dr. Wetzstein (p. 7), and to its south is an outlying scatter of cones and craters, which the Druze youths called Tulúl el Safá, a term naturally confined to the northern offsets at Damascus, where no others can be seen. A deeper blackness made the Safá stand conspicuously out of the Harrah: here the latter is a rolling waste of dark basalt, broken by and dotted with lines and veins of yellow clay, bone-dry at this season, and shimmering in the summer sun. These veins are generally known as "Ghadir," or hollows where water stagnates. The trend is north-east to the Ruhbah, a long waving streak of argillaceous formation. In the far distance, extending from east to south-east, and raised by refraction above the middle ground of flat basalt which lay beyond our rolling volcanic foreground, gleamed the sunlit horizon of the Euphrates Desert—that mysterious tract never yet crossed by European foot.

Here we began to appreciate the precautionary measures by which the old Roman soldiery kept the Bedawin at bay. Far to the east, and in the heart of the Harrah, which is bisected by a military road, are shown their outstations, Khirbat el Bayza, El Odaysiyyeh, and Nimárah, which must have been impregnable to the wild man, and behind which lay the waterless waste investing the fertile regions of Syria. But whilst civilization in these lands ebbs and flows, the Bedawi exerts a constant pressure from without: the moment he finds a weak place he rushes at it with ruin in his van and barbarism in his rear. Hence, according to no less an authority than Napoleon the Great, the ephemeral tenure of empire in olden West Asia. As has been shown under modern rule the Bedawi is lord of the land, and he will remain so till some strong European power revives the strong system of the Romans.

The next march was peculiarly severe. We left our hard beds at 4 A.M., and a few yards of advance showed us the "Ghadir Abu Sarwál," the "Hollow of the Father of Breeches," where we had been promised water. This deep depression in a shallow wady underlies a heap of rock which forms the right bank, and the yellow surface of caked and curling silt proved to us that it had

been bone-dry for the last six weeks. Here we again fell into the "Sultani," a main track which we had lost during the night; and, after half-an-hour, we struck El Nabash, a depression in the slope with the shapeless ruins of a settlement upon both banks. Then bending to the south-east, where a network of paths converged, we struck, at 6 A.M., the Ghadir el Ka'al: thus expending a total of 8 hours 40 minutes upon a march which, all assured us, may be covered by laden camels in 6 hours to 6 hours 30 minutes. This basin is, according to our guides, the drainage point of the Wady el K'rá'a, at this season a mere sink without watershed: trending east and west, it is about 90 yards long and some 4 feet deep: it does not outlast the year, and its highest water-mark is not more than 4 feet above the actual level where it would flood the eastern clay-plain.

We spent an enjoyable 50 minutes at the water, and then the watch showed 7·15 A.M. We retraced our steps, and fell into the Saut, or whip-thong. This is a line of drab-coloured clay, which subtends the western Lohf or ruins of the northern Tulúl el Safá.

* * * * *

After 1 hour 50 minutes up the Saut, which often became a scatter of stones apparently swept down from the Lohf, we turned sharp to the right, and crossed the lava-ridge, where it had a break; here it was subtended by several parallels which bore much the appearance of earthworks and cavaliers. Within was a grim and grizzly scene of volcanic ruin and devastation, a landscape spoiled and broken to pieces; here ghastly white, there gloomiest black, and both glowing under the gay sun of a Syrian June. The altitude was that of Damascus city, but the light sweet breath of the north ceased when we left the Ghadir, and the shape, as well as the components of the "Wa'ar," or Trachon, admirably condensed the heat: the air danced and reeked, affecting man and beast with intolerable thirst. All was bare of Bedawin: at the Rajm el Shalshal, however, where we rested in a shady fissure, we again saw traces of our friend on the dromedary.

We were presently surprised, at 4.20 P.M., by seeing the advanced party spring suddenly from their horses, and by hearing the welcome words, "Umm Nírán." The transit of the ugly monotonous "Wa'ar" had occupied four hours twenty-five minutes, and the day's journey a total of eight hours fifteen minutes. From Taymá we had spent seventeen hours, which result was a distance of 23½ direct geographical miles.

The feature, concerning which we had heard so many curious

and contradictory tales, lies at the western foot of a fang-shaped, scarped and round-topped block, which the Arabs called El Zirs, from its likeness to a grinder-tooth. Occupying the eastern slope of a rounded hillock of basalt, the mysterious cave opens to the S.S.E. (133°), with a natural arch of trap which at first sight appears artificial, and it is fronted by a circular hollow of clay, to which rude steps lead from the stony eastern edge. There is another approach from the west, and both show that at times the water is extensively used. All above this cave is dry as the sand of Sind: after rain, however, there is evidently a drainage from the fronting basin into the cave.

The floor, coated with shallow dry mud, is of ropy and other basalt, and the slope is easy and regular. The roof shows a longitudinal ribbing as if the breadth had been nearly doubled. A sensible widening, with a lozenge-shaped pier, the rock being left to act as column, succeeds the low and narrow adit through which a man must creep. Passing from this bulge to a second shaft, after a total of 200 yards we reach the water, a ditch-like channel, averaging 4 feet in breadth, with mastabahs, or flat benches of cut rock, on either side, varying from 2 to 6 feet wide. The line then bent at an angle of 50° to the N.N.E. Here, by plunging his head below the water, and by raising it beyond where the roof-spine descended, my companion found an oval-shaped chamber, still traversed by the water. He could not, however, reach the end; a little beyond this point the arch ceiling and the water met. The supply was perfectly sweet, and the thermometer showed 71° to 72° Fahr., the air being 74° Fahr.; the atmosphere was close and dank, and the basalt roof was dripping. The water varied in depth from a few inches to mid-thigh, and the taped length was 140 feet. Thus the total length of the tunnel was 340 feet; but it may be greater. According to the Arabs, it is supplied by springs as well as by rain, and the hottest season fails to dry it.

This curious reservoir is evidently natural, but it has been enlarged and disposed by art.

We are now at the southern limit of the northern Tulúl el Safá, a projection from the Safá Proper, the eastern Τράχων of the Classics, which apparently has been so puzzling to modern translators. Strabo (Lib. xvi. cap. 2, para. 20, Hamilton and Falconer; London, Bohn, 1857) says; "*Above* (read "beyond") *Damascus are the two hills called Trachones* (read "the so-called Trachones, namely the twin Wa'ars of the Lejá and the Safá"); *those towards the parts* (*i.e.* south and south-east) *of Damascus, occupied by Arabians and Idumeans promiscuously, are mountains of difficult access, in which are*

caves extending to a great depth. One of these caves (Umm Nírán?) *is capable of containing* 4000 *thieves.*" Pliny (vol. i. chap. 16, Bostock and Riley; Bohn, 1858) reckons Trachonitis amongst the Tetrarchies. The 'Revolt of the Trachonitis' is the subject of an Essay by Josephus ('Antiquities of the Jews,' Book xvi. chap. 9). Ptolemy (chap. xv. Table iv.) mentions amongst Syrian mountains the Alsadamus, whose centre would be in E. long. 71°, and in N. lat. 33°, and the Bathaneæ Provinciæ (Bataniyyah or Bashan) à cujus orientali parte est Saccæa (Shakkah). Et hujus sub Alsadamum Montem sunt Trachonitæ Arabes." Popular works (*e.g.* Smith's 'Classical Dictionary,' *sub voce*) of course repeat that Trachonitis was "for the most part a sandy desert intersected by two ranges of rocky mountains called Trachones." Similarly in the 'Concise Dictionary of the Bible,' Trachonitis is represented to have included "the whole of the modern province (!) called El-Lejah, with a section of the plain (?) southward, and also a part of the western (add eastern) declivity of Jebel (Durúz) Hauran. This may explain Strabo's two Trachones." Our fortnight's excursion will, it is hoped, introduce a correct topography for future writers. The fact is that the Safá or Eastern Trachon, together with the western, that is to say the Leja Proper, would be included in the Tetrarchy of Trachonitis, which thus extended from Auranitis or the Hauran Valley to the Desert of the Euphrates.

The shape of the Tulúl el Safá region is pyriform, like the Leja; the lone El Mafradah forms the stalk; the bluff end to the north is the Tell Shámát together with its dependencies, whilst to the north-west the boundary is the Arz el Jaháshshiyyah, looking like the dry bed of a torrent, brown and rust-stained. We did not lay down the eastern limit, but the villagers of Dhumayr pointed out certain Istirát or unnamed cones depending upon the Umm Rakíbeh. This frontier may perhaps be extended to the Jebel Says bordering upon the Hamád Region.

We set out at 5 A.M. in a cool west wind, making north for the great red cinder-heap known as Umm el Ma'azah (Mother of the She-goat). After 1 hour 35 minutes, in which we covered perhaps 4½ direct geographical miles, we halted for observations at the foot of the cone, and then we fell into the trodden way which winds round to its west. After 20 minutes of slow march, we directed the camel-men to make straight for the Bir Kasam, whilst we ascended the Tell 'Akir, by the Bedawin pronounced El 'Ajir. Usually known as the Shaykh el Tulúl, this "Head-man of the Hillocks" rises some 7 statute miles from the Umm el Ma'azah. We then rode up in 1 hour 20 minutes to the foot of the cone,

which springs from a high plane, with large outliers trending to the south with a little westing. Some minutes were spent in stiff climbing up the ridgey surface of thoroughly burnt scoriæ. The angle of the north-western slope was 19° 30′, that of the north-eastern 22°; the southern ramp up which we walked showed 22° 30′, and the stoniest part above the lateral folds reached 24°. We then ascended the eastern or highest point, for a better prospect of the peculiar scene before us. Viewed from this elevation the volcanic Tells and craters, modern tertiary and pleiocene, which before seemed scattered in wild confusion, fell into three regular lines, disposed nearly north and south. The middle range is represented by the Umm Izn (Mother of an Ear), so called because the table-top has a projection at one end, a kind of "cock-nose," breaking the straight line of features. About the centre of the line stands the "Monarch of the Mounts," and to the south project the Zirs and the Raghayleh Blocks. The plain was silt upon a limestone floor, explaining how from afar a yellow sheet appears spread to the very bases of the cones and pyramids. The latter rise from this sterile investment in naked heaps, black and white, red and yellow; they are table-topped and saddle-backed, as well as conical, whilst inky dots show the smaller fumaroles and sable bars and lines the connecting ridges of basalt. All the Tells, especially those to the north-west, project immensely long black tails to the east. The zebra-like stripes of black and white are the effect of the regularly blowing west wind, which dispose the fine and comminuted dust of the shells produced about the Swamps, in thin sheets over the western slopes of the cones, whilst the latter shelter the basalt ground to their lee or east.

After inspecting the 'Akir, we had a truly wearying and monotonous march over the hilly plains to the west. The Druzes, as usual, rode forwards, leaving us to follow with the camels, and every hour and a quarter of march obliged us to dismount, tiring us by want of exertion. At last, after three hours thirty minutes of actual riding, we came upon the scorched yellow white flat of the Kala'at and Ayn Kasam (the Fort and Hill of an Oath), concerning which I cannot discover a trace of Arab tradition. We reached the fort in thirty minutes, and thus ended our total of seven hours forty-eight minutes, the work of that day. We had great trouble in finding the well which maps place to the south-east of the Kala'at. It really bears 10° and 9° 30′ from the Tell Kasam.

The next day (Monday, June 5) was the last of our desert excursion. The Druzes quietly left us during the night, under the escort of one of their number, Mahommed Kazamani, who, though

badly wounded in a late fray, followed us to Damascus and received a five-shot revolver as a reward. But instead of making for Dhumayr *viâ* the Derb el Ghazawát, or Road of Razzias, fortunately for us we determined, despite the unusually hot and still weather, to inspect the Dakwah Mountain, upon which so many of our fellow-countrymen have cast longing looks from the minarets of Damascus. The view from the summit enabled us to correct the position of the Salás Ikhwán, or Three Brothers. As will be seen, they adjoin the Dakweh, whereas our maps place them upon a parallel instead of a meridional line, and give them the curiously corrupted name "Tulesawa." At 4.50 P.M. we reached the Dhumayr village, where we were received with effusion by the good Rashid El Bostaji. We had covered 20 indirect miles from Jebel Dakweh, and a day's total of 30.

Our escape had been narrow. The messenger set out from Shakkah on Friday, June 2, and reached the Ruhbah Valley on the evening of the next day. The Sunday was employed in mustering the Bedawin. The latter missed us at the Umm Nírán, at the Bir Kasam, and upon the Robbers' Road; in fact, they were a few hours too late, and our zigzag path had saved us from the *Boyaume des Taupes*. The party numbered 80 to 100 horsemen, and some 200 Redifs (dromedary riders), two to each saddle. I duly appreciated the compliment of sending 300 men to dispose of three. The felon act failed, however, and our fifteen days of wandering ended without accident. We entered Damascus before noon on Wednesday, June 7.

Mr. W. G. PALGRAVE said Captain Burton was the only European who had properly explored the region of El Safá. He himself had been over about two-thirds of the same ground, though without reaching the cavern which Captain Burton had described. His own visit to that part of the country terminated at the southern end of El Leja. This great volcanic district was celebrated as being the scene of the destruction of the Egyptian army in the time of Ibrahim Pasha when they attacked the Druzes in their basaltic labyrinth. In every respect, the description given by Captain Burton was most exact. For himself, during the last five years his time had been busily passed in that part of the world known as the Caucasus and the Anti-Caucasus, and since his return to England his state of health had entirely prevented him from preparing what he should have otherwise prepared, some memorial of his labours for the benefit of the Society. However, he trusted, before leaving England, to be able to do so, and to give some information regarding the volcanic district of Eastern Asia Minor and the traces of the glacial period, which were very distinctly marked on the uplands of those regions.

The PRESIDENT stated that M. de Saulcy had announced his discovery of a new dynasty which had reigned in the Trachonitis. It had always been known that Herod appointed a Jewish general, Zamaris, to guard the trade coming from Babylonia *viâ* Palmyra to Damascus, and coins of that king were in existence; but lately De Saulcy had discovered coins of the son and the

grandson, so that an actual dynasty was now acknowledged in numismatology. These kings must have ruled during the whole of the first century A.D. Very little had been known about them hitherto, or about the country. Some twenty years ago a Turkish general who had commanded an expedition there, gave him a description of the district; and Captain Burton's account now verified the accuracy of the description.

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2. *Geography of Southern Arabia.* By the Baron VON MALTZAN.

HAVING in former years travelled in Central Arabia, and accomplished in 1860 a pilgrimage to Mekka, the author's attention has been of late particularly drawn to another part of the peninsula, viz. the extreme South. Wrède's travels had left a great part of Southern Arabia unexplored. They, in fact, only comprised the country between 48° and 49° 30′ E. long., reaching from the coast to about 15° N. lat. Another valuable addition to our knowledge of the southern part of Arabia was made in July, 1870, by the excursions of Captain Miles and Mr. Munzinger. It may in fact be said that these gentlemen continued the work of Wrède. Thus a space of nearly three degrees of longitude and about two of latitude of Southern Arabia might be called more or less explored. The author spent the winter of 1870-1 at and near Aden, and first investigated the language of the Mahrah tribes. He was enabled to draw a grammar of their interesting language, which is evidently a dialect of the now nearly extinct old South Arabic idiom, closely connected with the Ethiopian and even with the modern Tigré dialect. Part of these researches have already been published by him in the German 'Oriental Review.'

For his geographical researches he chose the territory to the north of Aden between the strait of Bab-el-Mandeb and 48° E. long. Here he had also a vast extent of nearly virgin soil, it being a most extraordinary but, nevertheless, true fact, that during the 32 years that Aden has been an English colony nothing had been done for the exploration of the interior of the neighbouring country. The nation which furnishes the most intrepid of all travellers has left a country so near its own possessions unexplored. He commenced by some excursions in the neighbourhood of Aden. These he afterwards extended to some of the neighbouring little states of independent sultans. But he soon found that the information he obtained on these occasions was very limited. He therefore began another system—gathering as much information about it as he could at Aden.

He began a systematic research, receiving every day a certain number of Arabs from all parts of the interior, and questioning

them on the names and positions of the different topographical points and genealogical divisions.

He had his doubts as to the exactness of his information. But fortunately on this point he was not without means of proof. He had an Arabic work on the geography of the whole peninsula, written by el-Hamdanee, an author very little known in Europe, who died in 335 of the Hejira. Of this work, called 'Jareeret-el-Arab,'* of which there exists only a single manuscript in Europe, he luckily found a second copy at Aden. It is the only work giving information on the southern part of Arabia, on which él-Yakût el-Edreesee, Aboolfeda, and the other geographers, are almost silent. In this book he found the full confirmation of all the Arabs had told him, and nearly all the names mentioned by his informants and their positions indicated just as they had given them. This was a great satisfaction.

The conformation of the surface in all this part of South Arabia is very irregular. Plains near the sea are the rule; yet in many places we find high volcanic rocks, such as the Jebel Shamsham (or Shamsân) at Aden. But these mountains of the coast are isolated, and have no communication with those of the interior. The plain is resumed behind them, as it is to their right and left.

In the eastern part of the country we first find the Wahidee states. Here are volcanic rocks near the coast, then a desert with only a few oases stretching as far north as el-Hauta. In the east and north of this desert there are long chains of low hills perfectly barren, very narrow valleys, and in them the vegetation of an oasis —palms, a little corn, sesam-oil, and tobacco. The scenery changes before reaching Habban, capital of the Upper Wahidee, situated in an elevated country. Here there there is greater fertility, owing to the tropical rains that fall in this region.

Everything in South Arabia, as in most tropical countries, depends on this, whether a country receives the regular summer rains or not. No part of this half of Southern Arabia is doomed to utter and hopeless sterility by its geological formation alone, there being here no real desert like the Rabat-el-Khalee in the more central part of Southern Arabia. Even on the volcanic rocks at Aden, I have seen herbs growing after rain. It is a curious phenomenon that in Southern Arabia, though being a tropical country, the interior alone receives the tropical rains; not so the coast, which seems to stand under the influence of the Red Sea climate and only the very irregular winter showers. It is true the

* The orthography of proper names is left as given by the author, who has preferred the form suiting English pronunciation.

winter rains are sometimes abundant. Even at Aden, that driest spot of the whole peninsula, an overflowing of the cisterns has been witnessed. But these showers are by no means to be reckoned upon with any certainty; and, on an average, it may be said that out of three or four years only one has sufficient rain, and in consequence favours fertility. Thus the whole of the coast is barren with the exception of a few valleys, such as Lahej and Abian, which have a rivulet that receives the tropical rains in its upper course, and, bringing down their waters, fertilises this otherwise barren country.

After the Wahidee states (proceeding from east to west) are the states of the lower and upper Owlakee, reaching from the coast to about 15° N. lat. The land of the Lower Owlakee near the coast is a plain, rising gradually, and reaching to a mountainous country of middle elevation near its northern terminus at a place called Khubber. This whole land is poor and sterile, being a coast country, and consequently not receiving the regular rains, though it has a rivulet, the Wadee Howair, which, however, seems to lie entirely to the south of the region of tropical showers. The consequence of this is, that we find only a very poor people, the Baa Kaazim, inhabiting the valley of the Howair. To the north of Khubber the country of the Upper Owlakee begins. This is entirely different, owing to the regular summer rains. North of the mountains there extends a very rich plain, called Markha, rising gradually to the high tableland of Nisab, the capital of the Upper Owlakee. All this high ground is fertile.

A step further to the west we find the important Fudhlee tribe whose territory almost touches Aden. The real Fudhlee territory is hilly near the coast and mountainous in the interior. However, it is poor, having only the winter rains and no larger rivulets. Its capital, Sureeÿa (indicated in Haines' map as a village in the mountains without name), is in a hilly country in the east, not far from the sea. Shooghra, which is generally called the Fudhlee capital by Europeans, is only its seaport. The Owdalee territory, touching in the west the Yaafaiy, in the east the Owlakee, and in the north the Rezaaz states, is very elevated ground, the Jebel Kaur, one of the highest mountains of South Arabia, filling up nearly its entire space. It is also fertile, suffering no want of water. Its capital is Ghoder, situated at the foot of the Jebel Kaur. Besides this, it has the towns of Dhaker, Orfaan, and Theÿre, all in a very elevated position on the heights of Jebel Kaur. This mountain-land produces excellent corn, jowaree, wheat, tobacco, and sesam-oil in great quantity. At Ghoder there are forty oil-mills. But

besides their ancient territory, the Fudhlee possess the country of Abian, conquered from the Yaafaiy tribes about forty years ago. This, though being near the coast, is yet one of the most fertile parts of South Arabia, and celebrated as a first-rate cotton-growing country, owing to two rivulets, the Wadees Bonna and Hasan, in the midst of which it is situated.

The prosperity of Abian is also shown by its great number of towns, amongst which Maan, Maab (both situated on the Wadee Yeraanus), Rand, and Derjaaj, are the most important. Near the coast is also a once important town, called Asalah, which, before the conquest, was the capital and seaport of Abian. Now it has lost its sea-trade, the new masters, the Fudhlee, not allowing barques to take a cargo here, as they wish to draw all the commerce to Shooghra, the seaport of their ancient territory.

As to the consumption of coffee by the Arabs, it is an error generally indulged in by Europeans living at Aden, that the natives only use the drink called kishr, which is a sort of tea made out of the covering leaves of the beans. This is only the case in the hot plains near the coast, where the real coffee is considered too exciting. But Yaafaiy being chiefly a mountainous country, where the winters are cold, the real coffee is very welcome there for its warming qualities, and the kishr is only used in the lowlands. Coffee is often drunk with milk, as in Europe. As to the growing of the plants, it seems that, in Arabia at least, the tropical rains are absolutely necessary to it. No coast-country produces coffee, even if it has a rivulet, not even the otherwise fertile plains of Abian and Lahej, and Mokha never produced any. The coffee was only called after it because it was formerly the principal port for its exportation.

On three sides this coffee district is surrounded by the immense mountains of the Yaafaiy, which form the highest region of western South Arabia. Their most southern part is called the Lower Yaafaiy land.

The Upper Yaafaiy have no regular government, but are divided in different independent tribes, the strongest of which live at Atara and Mansita. The cold here is intense in winter, and the natives are obliged to cover themselves with sheep-skins.

The third division, the Rezaaz, do not call themselves Yaafaiy, nor do the Yaafaiy call them by that name; but they undoubtedly are such from their origin. Their actual name is derived from the reigning dynasty, whose founder, about the year 1790, won the battle of El Orr, by which he made the country independent of the Upper Yaafaiy. The Rezaaz inhabit all the land to the north and

north-east of the Yaafaiy territory, and the country to the north of the Owdalee State. Their territory is formed by the northern slopes of the great Yaafaiy mountains, and also those of the Jebel Kaur. The descent from the highland is at first rather abrupt, then its valleys descend more gradually, and open on the large plains of Central South Arabia. The capital, Baÿhaun, is situated in the lowland. The only commercial town, Baÿdha, stands at the northern foot of the Jebel Kaur, near the frontier of the Abdalee. The produce of the country is as varying as the elevation of the ground. The south being here the highest land, produces barley, wheat, sesam-oil, jowaree, tobacco, and excellent fruit-trees. The natives boast particularly of their peaches. In the middle region we find cotton, indigo, tobacco; and the lowlands are chiefly a date-growing country. The Sultan has absolute power only over the inhabitants of the commercial town Baÿdha. All the other natives merely acknowledge him as a military leader, but pay no taxes, and are not subjected to his justice.

Returning to Aden and directing our steps due north, we find the little Abdalee State, commonly called Lahej. This country, though near the coast, is yet very fertile, owing to the Wadee Tobbaan, in which water is kept nearly all the year round by a tolerably good system of sluices. The capital is generally called Lahej, but its real name is el-Howta, Lahej being that of the district in which the capital lies. It is also a common mistake of Europeans to call the Wadee Tobbaan by the name of Mas'dam; but this name, or rather Mehai'daan, is the designation of a large plain to the east of Lahej, which is not even touched by the river. Niebuhr and Wellsted first brought this wrong bit of information to Europe; but all the natives whom I asked, amongst them the Sultan of Lahej himself, declared that Tobbaan was the name of their river, and Mehai'daan that of a rather barren plain to the east.

North of Lahej is a vast but thinly inhabited territory, belonging to the Howshabee tribe, who are Bedouins. They have a Sultan, but are hardly subjected to his authority. This is chiefly a country of mountains and high table-lands, receiving the tropical rains, and consequently fertile where it is cultivated, as in the large plains about Ṣaaha, the principal village, which is rich in corn.

Still further to the north is the State of the Ameers, with the capital, Dhalaa, a rich country of middle elevation, with a few high mountains. Politically, this is the best administrated State of all South Arabia, all its inhabitants being subject to Sultan Shaafel of Khotan, whose ancestors were governors for the Imaum of Sanaa, and declared themselves independent on the downfall of their

power. However, within this territory there is an independent oasis inhabited by the Shakeree tribe, which the Ameers have in vain tried to subdue.

North of this begins a mountainous territory, with the high peaks of Jebels Tchauf and Merraïs, inhabited by many small independent tribes, some of which, however, have of late years become subjects to the Doo Mohammed, the great modern conquerors of Yemen, who have spread their power over a great extent of the ancient provinces once belonging to the Imaums of Sanaa, whose mercenary soldiers they formerly were. There are also several independent towns, Raateba being the largest of them. It is situated between the high mountains of Tchauf and Merraïs. Here the cultivation of a tree called Kaat begins, whose leaves the Arabs chew, and which produce an agreeable exhilarating effect, but not obnoxious to health, like opium or hasheesh. The leaves of the Kaat fetch a high price all over South Arabia. The Sultan of Lahej told me that in his house the daily consumption amounted to ten dollars' worth. A Kaat country is consequently always comparatively rich.

To the west of Aden is the very small State of the Akrabee, having only 20 square miles of superficies. The principal village is Beer Ahmed, well known to the Aden sportsmen. The territory is barren and without water; not much better than Aden itself.

West of the Akrabee begins the large Subeihah country, stretching as far as Bab-el-Mandeb. It is nearly entirely barren, being a coast country, and having neither sufficient rain nor well supplied rivers. Near the sea, in a few places, there are isolated volcanic mountains; behind them the plains extend to the right and left. It is a curious fact that the only European who ever traversed this country and gave an account of it (a German, called Lutzun), should not have found a single village, a single river, or any locality having a name, on a journey of about eight days. Yet there are many villages, wells, hamlets, castles, mentioned both by my informants, and by the old geographer el-Hamdanee, who lived nearly a thousand years ago. It is true they are not very important, most of these villages consisting of some huts and one or two fortified castles. Only the town of Ghareeya seems to be a larger plac , owing its importance to the tomb of a saint, commonly called the Radhee, which is visited every year by thousands of Arabs. The chief produce of the country seems to be an excellent breed of camels. The Subbeihah have no government, but are divided into a great many little independent tribes.

North of them is a mountainous country of middle elevation,

inhabited by the independent tribe of the Mokteree, who have no towns, but good large villages and several strong castles. The tropical rains fall here, and consequently the country is fertile. It produces coffee, cotton, tobacco, indigo, and sesam-oil in great quantity. The Mokteree state touches the vast mountainous region of the Hojree, once a strong tribe, but now in great part subjected to the Doo Mohammed. Only a few tribes, such as the Benee Hamad, have kept their independence. This country is rich and fertile, produces coffee and cotton; the highlands may be called the home of the Kaat-tree, this precious plant growing here in greater abundance than anywhere. Here there are also mineral baths, of whose power the Arabs tell fabulous things.

The Hojree territory touches the more or less known regions of Taur, Yereem, and Ibb, and my task comes to an end here as far as regards the description of the country. I shall only add a few notes on the inhabitants, as to their mode of life, religion, and manners.

The inhabitants of this part of Arabia nearly all belong to the race of Himyar. Their complexion is almost as black as that of the Abyssinians; their bodies are very finely formed, with slender, yet strong limbs; their faces are Semitic, noses generally aquiline, eyes full of fire, lips small, and mouths of very diminutive proportions. They are generally thin, and never fat; they have little or no beard, their hair is long, but curly, not woolly.

They hardly wear any garments, nothing except a large loose cloth reaching from the waist down to the knees, and a small turban. The women have a skirt and sort of shawl. In the western district they also wear black trowsers, and in the towns a bit of cotton all over the face, without holes for the eyes.

Their only luxuries are their weapons, the long musket with the two powder-horns, and the Janbiyyah, a sort of dagger richly-ornamented with silver. Some also wear the straight sword called Nemusha.

They live in large castellated and fortified houses, three or four stories high, with towers, fortified terraces, and loopholes. The common people, however, inhabit huts of straw or palm-branches.

As to religion, the inhabitants of this part of Arabia all belong to the orthodox sect of Shafaiy. They detest the heterodox Zidiyyah of Yemen, who so long oppressed them, and the Doo Mohammed belonging to this sect. The hatred against them is general, and it is looked upon as the greatest calamity when a country is conquered by them. I cannot understand how Wellsted could believe that the inhabitants of Lahej were Zaidiyyah. They are just the

most fanatical haters of this heresy, as they call it. A curious custom exists here as regards circumcision, which is operated on both sexes, and at the very early stage of the seventh day of life, just as it is prescribed in the Mosaic law.

The Zaidiyyah sect in this part of Arabia begins to have frequent worshippers, only north of el-Kautabah. Er-Radaah—a good town in a fertile country—is about the first Zidiyyah town we find, proceeding from north to south from Aden.

The PRESIDENT, in explanation of the remarks on Aden made by the author of the paper, said that wherever our frontiers in India came into contact with independent States extreme jealousy naturally existed of all exploration or survey beyond our borders. This, no doubt, applied to Aden. But when Baron von Maltzan accused the English of indifference to Arabian exploration, it was sufficient in reply to notice the presence at that meeting of Mr. Palgrave and Captain Burton; the former of whom had travelled from the north through the Nejd country to the Persian Gulf, while the latter had actually performed the pilgrimage to Mecca.

Mr. PALGRAVE said the southern portion of Arabia was of remarkable interest, because it appeared to be the cradle of the pure original Arab race. Up to the present time, the person who had most explored that district was the celebrated Niebuhr, father of the historian. For himself, he only skirted the northern and eastern frontiers of Yemen. When the information obtained by Baron von Maltzan was published, he should be extremely happy to see how far it agreed, not only with the data given in known works, but also with what he himself had learned and seen. In the first fervours of Mahometanism, everything in the shape of symbols of the ancient Arab worship was totally destroyed; but recently an idol had been discovered which, perhaps in consequence of its smallness, escaped the general destruction. This idol was brought to Aden, and was shown to Dr. Millingen, son of the celebrated Dr. Millingen in whose arms Byron died at Missolonghi, and Dr. Millingen sent him a representation of it. It was a very remarkable one, and in some respects elucidated the ridicule thrown by the Koran upon the Arab idolators because they worshipped a female deity. The image was certainly partly female. He hoped that some account of this idol would appear in the papers which would be sent to the Society, and should be glad to render any assistance he possibly could in the matter, but he would be still more glad, should it ever be his good fortune again to put foot in those regions and examine the land.

Captain BURTON said that Aden was the very worst place in the world to start from for an exploration of Southern Arabia. Some time ago, Captain Miles made an exceedingly good journey from it; but his efforts had never been appreciated as they ought. Lieutenant Cruttenden, I.N., also went up the Yemen country in 1836, and laid down the latitude and longitude of Sana'á, its capital. When he himself was at Aden, he found it extremely difficult to do anything in the way of exploration, because Indian officers were threatened with court-martial every time they left the walls. He risked his commission half-a-dozen times by dressing like an Arab and driving camels, but under the circumstances it was impossible to obtain any correct geographical information. Baron von Wrède also went to Hadramaut. He disagreed with Baron von Maltzan about the word "Hadramaut." In Genesis (x. 26) it was Hazarmaveth, from the son of Joktan; this was, in fact, the classical name of the whole district. Baron von Wrède was attacked by the Arabs; the whole of his notes were destroyed, whilst some of his clothes, and to some extent his person, were rather injured. On his return to England, he boldly

wrote out the whole account and got it recommended to the Geographical Society.

Dr. VAUGHAN said he had resided in Aden nine years. He thought Baron von Maltzan had spoken rather unadvisedly with regard to what the English had failed to do, because there could be no doubt that Aden would be the place of all others least suited for an exploring expedition to start from. He himself travelled as a doctor for the purpose of vaccination, and managed to get off free; but of the next company of officers that went, one was killed.

The PRESIDENT said that, besides Captain Cruttenden, Lieutenant Wellsted and Dr. Houghton had made explorations on the coast. The whole of Southern Arabia was very interesting from its archæology. So vast a quantity of inscriptions and tablets had been sent home that the Himyaric literature had now become a recognised branch of archæology. The inscriptions already received could be numbered by hundreds. One convoy brought over upwards of one hundred and fifty copper plates. It appeared that the ruins of all the towns of Southern Arabia contained these native tablets, which gave an account of the origin of the country, and its history, with many curious details with regard to agricultural statistics. The subject had already been studied by several Continental scholars, and further researches were going on at the present day. This made the exploration of Southern Arabia a matter of still greater interest, and he trusted that the inquiries of Baron von Maltzan would be verified by the actual observation of some travellers, English or German.

Third Meeting, December 11th, 1871.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTATION.—*Dr. R. Heinemann.*

ELECTIONS.—*Dr. J. B. Gonsalvez Campos; Henry Cope, Esq.; Thomas Dyer Edwardes, Esq., Junr.; Philip Capel Hanbury, Esq.; Dr. R. Heinemann; F. Leigh Hutchins, Esq.; Lieut. F. W. Jarrad*, R.N.; *Alfred Jenoure, Esq.; Sir John Lubbock, Bart.*, F.R.S., &c.; *William Macdonald, Esq.; Daniel Macpherson, Esq.; Charles A. J. Mason, Esq.; Charles Hoskins Master, Esq.; Henry Mercer, Esq.; J. Young Messam, Esq.; James Mowatt, Esq.*, M.A.; *Edw. Wates, Esq.*

ACCESSIONS TO THE LIBRARY FROM THE 27TH NOVEMBER TO THE 11TH OF DECEMBER, 1871.—'Handbuch der Geographie und Statistik.' Von Dr. J. E. Wappaus. Leipzig, 1855-1871. 8 vols. Donor the author. 'At Home with the Patagonians.' By G. Chaworth Musters, R.N., 1871. Donor John Murray, Esq. 'A History of the San Juan Water Boundary Question.' By Viscount Milton. 1869. Purchased. 'Observations of Comets from B.C. 611 to A.D. 1640, extracted from the Chinese Annals.' Translated, &c., by John Williams. 1871. Donor the author. 'Redogorelse for en expedition till Grönland ar 1870.' Af. A. E. Nordenskiöld. Stockholm, 1871. 'Recherches sur les Monnaies des Indigènes de

l'Archipel Indien.' Par H. E. Millies. La Haye, 1871. Donor the author. 'Die Verbreitung der Wärme in der Nördlichen Hemisphäre.' Von H. W. Dove. Berlin, 1855. 'Der Verbreitung der Wärme: Oberfläche der Erde.' Von H. W. Dove. Berlin, 1852. Purchased.

ACCESSIONS TO THE MAP-ROOM SINCE LAST MEETING OF NOVEMBER 27TH, 1871.—United States—Plan of the Upper Branches of the Colorado and Zŭni Rivers. By Col. J. J. Abert, of the Topographical Engineers. Presented by J. Barwise, Esq., with his Remarks. The Chain of Mont Blanc, from the Surveys of Captain Mieulet, General Dufour, and M. A. Reilly, Esq. Compiled and presented by E. Whymper, Esq., F.R.G.S.

On taking the chair, the PRESIDENT spoke as follows :—

"At a time of such extraordinary tension of public feeling, when a telegram arriving at any moment might plunge this Society, in common with the whole nation, into the profoundest grief, it had occurred to me that it might be a violation of propriety, a desecration of the solemnity of the occasion, to invite your attention to matters of ordinary geographical interest; but on further consideration, and after consultation with the governing body of this Society, it has appeared to us that it is not inconsistent with the feelings of warm loyalty which we are proud to profess, of the warmest affection to the person of the illustrious sufferer at Sandringham, and of sympathy with his afflicted relatives, that we should pass an hour in discussing the subject of African discovery, in which His Royal Highness the Prince of Wales, the Vice-Patron of this Society, is known to have always taken the deepest interest, and with regard to which, further, as is also well known, he has most essentially befriended the cause of geography by his powerful and personal interest with the Viceroy of Egypt. Under these circumstances, I trust we may be permitted to pass an hour in discussing the most interesting question of the Equatorial Lakes of Africa."

The PRESIDENT then announced that he had a communication to make to the meeting on another subject in which the Geographical Society took an equally warm interest—namely, Dr. Livingstone. At the last meeting he had occasion to read certain letters which had been addressed by Dr. Kirk to our late revered President and to the Government of Bombay, in which he described the accidental outbreak of troubles in Africa which had cut off the communication between the sea-coast and Lake Tanganyika. The despatch on the same subject addressed by Dr. Kirk to the Foreign Office had since then been received, and proved to be a duplicate of that before read, addressed to the Government of Bombay. He wished now to announce the measures which the Council had that day proposed to undertake in consequence of the receipt of these letters. It appeared to the Council and himself, now

that the hope which we had of communicating with Dr. Livingstone through Mr. Stanley, the American traveller, must for the present be abandoned; and it had become, consequently, their duty to cast about for some other means of reaching him. Their intention now was to address the Foreign Office, with a view of arranging either directly from the Foreign Office, or through co-operation between the Foreign Office and our Society, some means of communicating with the interior district where Livingstone was supposed to be. One plan proposed was to send native messengers, offering a reward of one hundred guineas to whichever would bring back a letter in Dr. Livingstone's handwriting to the sea-coast; another, recommended by one of our African travellers, was to organise a direct expedition headed by some experienced and well-qualified European. Which of those two arrangements might be most advisable to pursue would depend upon the result of their communication with the Foreign Office; but the Society might rest assured that the Council would leave no means untried of ascertaining whether Dr. Livingstone was detained at Manyema, where he has been so long reported to be staying, in company with the Arab trader Mahommed bin Gharib.

Mr. HORMUZD RASSAM, on being asked for his opinion, said his experience in Abyssinia taught him that the best way to get information from individuals at a distance was by sending native messengers. On three different occasions he adopted this plan of communicating with the Magdala captives from Massowah. He employed three different messengers—one Christian, another a Mohammedan, and a third a native of Western Abyssinia. He sent them by different routes, and was perfectly convinced that they were ignorant of each other's movements. One of them, it was true, concocted a letter and brought it back; but the other two returned within ten days of the promised time with authentic intelligence. Several Arabs at Muscat, who had travelled as far as Lake Tanganyika, had assured him that there was no difficulty in going up and down with beads and other articles for barter.

General RIGBY felt convinced that the plan recommended by Mr. Rassam would entirely fail. In Abyssinia single travellers might go from one distant part of the country to another, but on the east coast of Africa they could not. All travellers must there be accompanied by caravans with a body of armed men. The only caravans that performed the journey to the Lakes were those of traders, to whom the time occupied was of no moment, and if the Society depended on any single native going in with a caravan and having to wait until he could return with another, they might probably have to wait five years or more. He was convinced the only means of communicating with Livingstone, and of rescuing him, would be by sending an enterprising English traveller from Zanzibar with a small armed party, well provided with supplies.

Mr. RASSAM wished to add that he had communicated by means of messengers with chiefs in the distant Galla country, to reach whom a journey of thirty or forty days was required. He thought there might be no harm in trying both plans.

The PRESIDENT said the Council had decided first to try the plan of offering a reward to native messengers, and if that failed they might then undertake the more serious affair of sending an expedition.

The following papers were then read:—

1. *Notes on the Rev. Thomas Wakefield's Map of Eastern Africa.* By KEITH JOHNSTON, F.R.G.S.

THE author stated that he had been honoured by being asked to read the notes he had appended to Mr. Wakefield's paper in the last

volume of the Society's 'Journal' (vol. xl., p. 303), which he had made during the preparation of the map accompanying Mr. Wakefield's memoir.

Mr. Johnston added the following prefatory remarks to these notes:—

"The coastland of that part of Eastern Africa within which the great lakes have been discovered, was first brought under the influence of European advancement by the Portuguese in the end of the 15th century, when their maritime power was at its height. The pillar raised by Vasco de Gama to mark the place of his landing, after rounding the Cape of Good Hope, still stands on the shore at Melinde.

"It does not appear that the Portuguese obtained any knowledge whatever of the interior of the country, but rather that they were fully occupied in maintaining their hold upon the coastland.*

"On the decline of the home-power of Portugal, their authority on this coast of Africa also fell, and was gradually replaced by that of the Arabian princes of 'Oman, till, before the 17th century had closed, there was an end to the sovereignty of the Portuguese along the whole of the north-east coast.

"When, in 1844, owing to the friendly inclinations of the then Imaum of Muscat, especially towards the British, the Church Missionary Society was able to found a station near Mombas, nothing whatever was known to Europeans of the interior of the country.

"The first light was thrown on the obscurity of the land by the missionaries who founded the station; and between the years 1847 and 1852, Rebmann and Krapf, each in repeated journeys over the same ground, the one to the west, the other to the north-west, made known the vast snow-capped mountains of Kilima-Njaro and Kenia.

"Dr. Krapf had also, during this time, made two journeys south-westward, and had penetrated into the highland of Usambara, nearer the Zanzibar coast. Native reports of the existence of vast lakes had reached the missionaries from various points in the interior; and in 1855 Messrs. Rebmann and Erhardt, conceiving that these reports must refer to one lake, sent home from their station a manuscript, now well-known as the 'Mombas Mission Map,' in which the whole of the reported waters, from the Nyassa in the south to the Ukerewe northward, had been joined into one vast inland sea. The interest created by this remarkable document happily led to one of the greatest African journeys of exploration,

* See "Notes on East African History," in 'Krapf's Travels,' 1860.

that of Captains Burton and Speke, during which the Tanganyika and the Southern Victoria Nyanza were discovered.

"A preliminary journey by these explorers, in February, 1857, to the southern side of the highland of Usambara and the lower Pangani basin, also added considerably to our knowledge of the country more immediately under consideration.

"In 1861 and 1862 Baron von der Decken, accompanied by Mr. Thornton in a first journey, and by Dr. Kersten in a second, to Mount Kilima-Njaro, set at rest any doubt that might have arisen as to the accuracy of the discoverer Rebmann, by fully confirming his statement that the mountain is snow-clad at its summit; and, in determining a number of positions astronomically, enabled the itineraries of the missionaries to be laid down with greater accuracy.

"The traveller Brenner, in 1866, explored the lower course of the Dana River, and Messrs. Wakefield and New, successors to Krapf and Rebmann in the Mombas Mission, have together and separately made frequent short journeys on the coastland. It is greatly to be regretted that the manuscript describing an important journey made by Mr. Wakefield to the land of the Southern Gallas, after being only in part printed in the missionary notices of his church, has been destroyed, apparently in ignorance of its value.

"As far, then, as the edge of the plateau, on which mount Kenia and Kilima-Njaro rise, the coast slope is partially known, but no European has yet penetrated to that part of the plateau which lies between these mountains and the Southern Victoria Nyanza. The country, however, cannot be said to be entirely unknown, since the descriptions of a number of native caravan-routes crossing the plateau in several directions, have been collected from time to time by the missionaries and travellers on the coast, and information from a different quarter, confirming that which has been so obtained in its general outlines, has been recorded by M. Léon des Avanchers, a traveller in Southern Abyssinia.

"By far the most important collection of native information has been made more recently, by Mr. Wakefield, at Mombas, and the itineraries and descriptions obtained from Sádi bin Ahédi (printed in the last volume of the 'Journal') have almost the value of a European traveller's account.

"The value of the manuscript map which accompanies these descriptions lies in this, that whilst it has been prepared independently of the results of Rebmann and Krapf's, or Von der Decken's journeys, it agrees remarkably with these as to relative positions, and gives coherence to the formerly reported caravan-routes. As may be expected, the manuscript maps hows a tendency to increase

the distances travelled over landward, and at Kilima-Njaro this exaggeration amounts to about 30 geographical miles. The known geography of the coast-land, and especially the astronomical positions obtained by Von der Decken, however, give a scale by which the distances on the routes beyond the mountains have been reduced to what is believed to be nearly true.

"The leading features of the new geography thus opened up, and which may almost be termed discoveries, are the existence of numerous summits, besides those of Kenia and Kilima-Njaro, along the margin of the table-land; and among these the Dóenyo Ngái, reported by Erhardt, and said to be higher than Kilima-Njaro, though not so massive. Then the salt lake Náïvasha, mentioned by so many of the travellers on the coast, and possibly the Lebassa, heard of by Grant when in Unyamwesi, and the Njémsi volcano, which has a special interest since it is the only one, excepting the volcano of Artali in the Afar country, described by Mr. Munzinger, which is known to present any signs of activity in the African continent. The information respecting it is confirmed by various independent reports obtained by Erhardt, and by two separate accounts received by Dr. Krapf.

"The dimensions and general direction of the fresh-water lake Baringo are stated, and it is remarkable that, according to the newer information, this lake falls almost exactly into the same position as that assigned to it by Captain Speke; but between it and the sea of Ukara, a double route makes known a populous, pastoral, and even hilly country, allowing no possibility of a strait or water-communication of any kind between the two.

"The position of Baharini, and with it that of the shore of the sea of Ukara (or the Ukerewe), is a very important one, and though its place cannot be laid down with great certainty, yet it is believed that the position given to it is nearly its true one. The reduction of the length of the route to the scale given by Von der Decken's observations draws Baharini about one degree further eastward than it is shown upon Mr. Wakefield's manuscript; but it is connected with more certain positions by two routes, a westward one from Lake Náïvasha, and a south-easterly one to Arusha, south of Kilima-Njaro. If the position of Baharini is somewhat altered by more exact information, it is probable that it will be brought still further east, rather than taken westward.

"The main point of interest in connection with the great lake on whose shore Sádi bin Ahédi stood at Baharini, is the question whether it is indeed the same lake which Captain Speke saw, and named the Victoria Nyanza.

"It is observed that the reduction of the newly reported routes, made entirely without any reference to the extent of this lake, places its eastern shores very nearly in the same position as that indicated for them indefinitely by Captain Speke, and that its supposed area is not materially altered. That the names of the lake here given, the sea of Ukara (Ukerewe), the 'Second Sea,' or the Nyanja, should differ in some degree from that received by Captain Speke is of very little moment, but it is remarkable that not one single name of district, people, or place (with the exception of that of the Wa-Masai, a general name for the people of the whole region east of the lake) given in these new routes has any such remote resemblance to names reported by Speke and Burton, as to warrant an identification with any one of these. At p. 275 of his 'Lake Regions,' Captain Burton says—'These races (of the people of the eastern side of the Victoria Nyanza) are successively from the south, the Washaki, at a distance of three marches, and their inland neighbours the Wataturu' (lat. 2° 10′ in Speke's map). Then the Warudi, a wild tribe, rich in ivory, lying about a fortnight's distance, and beyond them the Wahumba or Wamasai. 'Commercial transactions extend along the eastern shore as far as Thiri or Ut'hiri, a district between Urudi and Uhumba.' The fortnight's distance from the south end of the lake should approach very near, if not actually, to the position given to Ukara by the new routes. It is possible that Ut'hiri lies close to the south of the district of Ukara.

"Again, the names of the native States indicated by Captain Speke as lying between the north-east of the Nyanza and the Bahari 'Ngo, are in no degree similar to those of the populous districts named on the caravan-routes which traverse these States."

Then followed the extract from the notes, *vide* 'Journal,' vol. xl. pp. 338–4.

2.—*On the Ukara, or the Ukerewe Lake of Equatorial Africa.* By Captain R. F. BURTON, Gold Medallist R.G.S.

[ABSTRACT.]

IN this paper the author repeated his conviction that the so-called Victoria Nyanza is not a lake, but a lake region. He had found new matter in support of this opinion in the able paper upon Routes in East Africa, published by the Rev. Thomas Wakefield, of Mombasa, in the last volume of the 'Journal' of the Society. As these routes were wholly taken from native authority, the President, Sir Henry Rawlinson, had remarked that the "Pundit system" might be found as useful in Africa as it has proved to be in high Asia. Mr.

Wakefield's notes had been ably and judiciously commented upon by Mr. Keith Johnston, and Captain Burton's object was to add emphasis to that geographer's remarks, and to supplement them with the experiences of a practical traveller. He laid down from native report the length and breadth of the Ukara Lake, which appears in the Ukerewe of Captain Speke, and in the Garawa of old maps. A caravan-route between the Baringo Lake—the Barenca of Mercator—enabled him to separate that basin altogether from the so-called Victoria Nyanza, and to divide the latter into three; remarking, at the same time, that many more such features were necessary in order to account for the number of effluents supplied by the explorers Captains Speke and Grant at the northern portion of their lake's inverted delta.

Mr. GALTON thought it had not been made sufficiently clear that the great breadth assigned to the south end of the lake rested mainly on data supplied by Captain Burton himself, who, in the account of his great expedition, gave the names on native authority of the tribes on its shore, east of where Speke reached them, and the distances to which these tribes extended, amounting in all to more than 17 days' journey. He stated this, to show the unsatisfactory character of geography based on native African information; and for the same purpose he would remind them of the information collected by Captain Burton only 20 miles from the north end of the Tanganyika Lake, as to the fact whether the river ran in or out of that lake. It was a cardinal point in African geography. Yet the information so collected was set aside on other grounds, in a paper read by Captain Burton a few years later. These facts were especially worthy of note, because Captain Burton's proficiency as a linguist and his assiduity in collecting information were well known to be extraordinarily great. As regards Captain Burton's opinion of the Nyanza Lake, he seemed to acquiesce in the breadth originally assigned to it, when he wrote the paper above alluded to, because he proposed in that memoir to alter its shape by dividing it into two parts by a horizontal line, whereas in the present paper he proposes to divide it by a vertical line. This sort of uncertainty, which was characteristic of all hypothetical geography, justified the policy of this Society which required the actual mapping of a country, to a degree which to some might seem out of proportion to its real merit; the reason being, that such a map, once made, was good for all time, whereas one based on native information continually required modification in essential particulars. Therefore, however elaborately these lake regions of Africa might be mapped upon the testimony of uneducated natives, he hoped that future explorers would not look upon the ground as preoccupied. He was sure that whoever succeeded in mapping them from actual observation would perform as good, and, in the true sense of the word, as original geographical work as he could do anywhere else in Africa.

General RIGBY said, in reading Mr. Wakefield's paper he had been very much struck with the remark that his native informant told him it was 60 days' journey along the shores of the lake from the southern end to the north, and even then they did not know the end of it. He himself had repeatedly heard the same account from natives at Zanzibar, who knew the lake perfectly well. The overseer of the Sultan's plantations at Zanzibar, a native of a village on the borders of the lake, assured him that he had been 60 days' journey along the eastern shores without coming to the end, and that nobody could tell how far further north it extended. He traced with his finger in the sand an

outline of the shape of the lake as known to him, which wonderfully agreed with Captain Speke's description.

Mr. BALL said, with reference to the reliability of natives, he had made during the present year a short expedition in the great Atlas, and had made inquiries, through interpreters, of every person he came across with regard to the geography of the country, but at last was obliged to give up those inquiries in despair, because the statements made were so utterly inconsistent with each other. He was therefore convinced that native information must be received with the greatest possible mistrust, until verified by the observation of educated travellers.

Captain BURTON said that the shape which he originally ascribed to the Victoria Nyanza was quite different from that which Captain Speke had given to it. He supposed it to be more in the form of a stocking. He had been within 20 miles of the end of Tanganyika, and did his best to get to the end, but failed. He had entirely modified his views with regard to the Victoria Nyanza. To General Rigby he answered that the 60 days' journey was not made by himself; he had merely heard that it was 60 days' journey. General Rigby knew as well as any person that an African would talk of 60 days just as he would of 30 days or 100 days, being utterly indifferent as to the number. He could quite understand how it was that Mr. Ball came to grief in trying to obtain information from the natives in Morocco. Dragomans were very difficult people to deal with. If the traveller knew anything of their language he would be their master, but if he knew nothing of the language they would be his.

Admiral COLLINSON asked Captain Burton what he considered to be the height of Lake Tanganyika.

Captain BURTON said it had been laid down by Mr. Findlay at 2800 feet. He had found a pencil note by Captain Speke, which had never been published, that his thermometer was 1000 feet below actuality, and therefore Speke had supposed the height to be 1800 feet. The other height, 2800 feet, was considerably above that of the Albert Nyanza.

Admiral COLLINSON asked if Captain Burton himself had made any observations for elevation on Lake Tanganyika.

Captain BURTON said when he was there all the best thermometers were broken, and they only had a common bath-thermometer left, which gave 1800 feet; but it was subsequently found to be two degrees wrong, or 1000 feet.

Mr. T. SAUNDERS hoped that the day had now arrived when that fabulous piece of water, Victoria Nyanza, was about to be resolved into its constituent parts. He was convinced that Captain Speke had been induced to lay down the eastern end of the lake from the representations of Mr. Macqueen, who had a great affection for Baringo. It was in consequence of what Mr. Macqueen said that he (Mr. Saunders) had placed Baringo on the map which Captain Speke took with him as an embodiment of the information regarding the countries he was about to traverse; and what Captain Speke did was too hastily to accept the answers given by natives to leading questions, and to show too great anxiety to join together the pieces of water which he noticed at intervals, so as to make a startling phenomenon to grace his name and discoveries. There was no need to go further than Speke's own narrative to show that there was not an atom of proof for the combination of the various pieces of water which he saw at different times. He only saw three separate pieces, and these he combined, for the water to the south of the falls he never saw at all. That was entirely an invention. He hoped that the time had arrived when people would no longer submit to that great blot on the map of Africa which had resulted from Captain Speke's error. Moreover, he hoped that the discussion of this subject would tempt some enterprising young men to explore thes-

almost unknown regions. Very little indeed was known about the relation of the western slopes of the mountains of East Africa to the eastern slope of the Nile basin, and even the extent of the Nile basin had not yet been determined. If African exploration was again to be taken up, he hoped a little more respect would be paid to the Congo. If there were such difficulties attending the effort to penetrate from the east coast, why should not attempts be again made from the west?

The PRESIDENT said he thought Mr. Saunders had hardly sufficiently considered that it was a case of necessity to place some reliance upon native explorers. If they entirely refused to accept the information so obtained, there would be a perfect blank in our maps of many regions. Judging from Asiatic experience, native explorers might be utilised to a very great extent. All the late discoveries in Central Asia had been due to them, and when once educated they became most valuable assistants. Of course, mere traders did not travel for the purpose of obtaining geographical information, and their statements must always be taken *cum grano salis*, and with a great number of grains too. Still, by comparing different results, a certain amount of truth might be acquired. It was exceedingly desirable that some more definite information should be obtained about the African lakes, and it was well worthy the consideration of the Council of the Society whether they should not put their shoulders to the wheel and endeavour to originate or co-operate in some expedition for the purpose of finally solving all the difficult geographical problems connected with the equatorial lakes. Competent persons might easily be found. Mr. Wakefield himself appeared admirably adapted for such an enterprise, if he would undertake it; but even if he would not, it was quite possible that amongst the rising generation some one else might be found to follow in the steps of Burton, Speke, and Grant.

The President then announced that the Council had that day received from the executors of Sir Roderick Murchison the sum of 1000*l.*, the interest of which was to be devoted to the advancement of geography, either by encouraging explorers, or by assisting authors to publish the results of their researches. Sir Roderick had already endeared his name to the Society in a thousand different ways, and they accepted this last offering with the utmost gratitude and respect for his memory.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Report of* VICE-ADMIRAL OMMANNEY, C.B., *on the International Congress for Geographical Sciences held at Antwerp.*

HAVING been honoured by your selection to officiate as the representative of the Royal Geographical Society at the International Congress for the Advancement of Geographical Science, held at Antwerp in August last, I beg to submit the following report:—

The Congress was held between the 14th and 22nd of August, pursuant to notices and invitations which had been circulated among the scientific Societies of Europe, and the respective Governments were invited to nominate delegates to the Congress.

The initiation for holding this Congress was taken by men of science in

Belgium, under the auspices of the Government in 1870; but, owing to the sudden outbreak of war, it could not be assembled until this autumn.

On the 13th of August the Congress was inaugurated in the time-honoured historical Hôtel de Ville of Antwerp, under the presidency of the Bourgomaster, who delivered an appropriate address, which was repeated in seven different languages, to which the several delegates from their respective nations made suitable replies. The city was decorated with flags and the Belgian national colours floated from the summit of the lofty spire of the Cathedral in honour of the occasion. The Academy of Antwerp was appropriated for the sitting of the Congress: it contains spacious rooms, with a very large hall, well suited for the exhibition of all objects connected with the science of Geography.

A special medal was struck, and conferred as the award of merit to successful exhibitors and for distinguished travellers.

The business commenced on the 14th of August with an opening address,* by Monsieur d'Hane Steinhuyse, "member for Antwerp in the National Chamber of Representatives," a very intelligent, courteous, and business-like gentleman. He was the moving spirit of the meeting, and presided over the Committee of Organization, of which the foreign delegates were members.

The foreign delegates were seated at the table of the Presidents and Vice-Presidents on a raised daïs; the general Secretaries sat at a separate table and recorded the proceedings. Each speaker addressed himself to the audience from the daïs, and was permitted to use his own native language.

The duties were divided into three sections: one for Geography, one for Cosmography and Ethnology, another for Navigation and Commerce. The sections met from 9 A.M. to noon, when questions which had been previously prepared and arranged were taken in order, were discussed, and conclusions drawn up. Reading from written papers was prohibited. At the afternoon meetings, which sat from 2 to 5 o'clock, when the presidency was conferred on each of the foreign delegates in succession, the reports of the sections were read, and the subject-matter was generally rediscussed before adoption. The Committee of Organization met again at 7 P.M. to transact the general business of the Congress, and at 8 o'clock a lecture was given by some eminent person in the saloon of the Royal Theatre. The evening lectures were very attractive and well attended: two of them were delivered by my countrymen—one by the Rev. S. J. Perry, of Stonyhurst, on Terrestrial Magnetism (exceedingly well given in French); one by Dr. Brown, descriptive of the Human Races and Botany of the Cape of Good Hope regions. Both of these lectures were very instructive, and deservedly met with great applause. Mons. Quatrefages, Ethnologist representative of the French Institute, delivered a most eloquent discourse relative to the origin and descent of man. Lieutenant Garnier, of the French Navy (our Medallist), gave an account of his travels in Cambodia. General Heine, of the United States, gave a description of a new line of survey for a ship canal through the Isthmus of Darien, discovered by a native of Columbia, Señor Gorgoza, as presenting fewer engineering difficulties for construction over those of any other route hitherto explored.

His Imperial Majesty the Emperor of Brazil, who was visiting Antwerp, took part in the proceedings and enrolled himself a member of the Congress. He was pleased to make favourable allusion to the warm reception he met with in London from this Society.

There was a fair attendance of Geographers from France, Germany, and Holland, with some few from other nations. I regret to state that very few attended from this country, though many gave in their adhesions. The only gentleman who supported me throughout the sitting of the Congress was the Rev. S. J. Perry, of Stonyhurst.

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* On the general progress of Geography for the last two centuries.

As regards the exhibition of Geographical works—maps, charts, globes, and other instruments—the objects which excited most interest were the reproductions from the original charts of Mercator, together with those of the early navigators and travellers. The Government Survey of Belgium was said to excel that of any other nation in distinctive delineation and copious information. In elementary educational works for public instruction in geography France produced the best. I am sorry to notice that very few works were exhibited from this country, which was much regretted; especially as I saw no works to surpass the excellent productions of our celebrated geographers.

His Excellency the Minister of the Interior for Belgium gave his personal attendance and presided over the closing ceremony, distributing the medals and rewards to the successful competitors. He delivered a very comprehensive and instructive address.

The members of this Society and the public in general will be gratified to hear that in the distribution of medals one was accorded to our illustrious African traveller LIVINGSTONE, with the most cordial expression of hopes for his success and safe return. Also that a special resolution was carried, with great acclamation, in testimony of the eminent services rendered to the world at large by Sir RODERICK MURCHISON in the advancement of geographical science, and for the generous support which travellers of all nations have received at his hands.

It is pleasing to notice the public spirit manifested by Major-General Sir Henry James in furnishing the Exhibition with specimens from his department at Southampton of the highest excellence, which were greatly admired, especially the Survey of Jerusalem, by Capt. C. W. Wilson, R.E., and model of the same, together with the Ordnance Survey of Sinai, and photographs. It is much to be regretted that other public departments in this country did not follow this example; for, with this exception, our nation occupied a very unworthy position.

A full report of the proceedings will be published soon, in which it will be seen that several questions of international importance were dealt with, resulting in recommendations for the consideration of the great Maritime Powers: for instance—

"The possibility of adopting the same first meridian by all nations.

"The desirability of fitting ships of war with apparatus for obtaining deep-sea soundings on all voyages, and preserving specimens from the bed of the ocean for investigation by men of science.

"Could nations agree to adopt one uniform system of colouring buoys, beacons, &c., and leading-marks for pilotage of coasts, harbours, and rivers?

"To devise the best means of determining oceanic currents.

"What advantages can science obtain by the exploration of the Polar regions?

"Recommendations for exploring the Antartic regions, and gaining more information respecting the depth of the ocean and the physical geography of the sea in high southern latitudes.

"The adoption of a uniform system of orthography for proper names, both in maps and in treatises of geography.

"The great importance of adopting a more extensive application in the use of warning storm-signals."

The above are extracted from about ninety well-considered and searching questions, the solution of which must elicit the opinions and support from all lovers of progress. I think that no one can ponder over such subjects without

feeling that a repetition of such a Congress as this must lead to much valuable inquiry and practical results, besides encouraging sentiments of friendship and good-will between nations.

The chief duty assigned to me was that of presiding over the Section for Navigation and Commerce. At the general meetings I gave some description of the Esquimaux races; my opinions with regard to the best means of reaching the North Pole; also some account of my experiences, and the labours and achievements of our Arctic and Antarctic voyages.

An excursion was made on the Scheldt to Ripplemonde, the birthplace of Mercator, in a Belgian Government steamer, to afford the Congress an opportunity of inspecting a fine bronze statue, lately erected to the memory of Mercator by the Belgian nation, whose system of constructing charts, three centuries ago, has conferred such lasting benefits on posterity. Such a memorial as this will be duly appreciated by navigators of all nations.

On the subject of giving elementary instruction on Geography in national schools, much inquiry was made on the part of my colleagues, the delegates, as to the systems adopted in different countries. On the whole, they seemed to look for guidance from this country, and from such information as I was capable of giving them it appeared that in this matter we are in advance of other countries; in Belgium some more vigorous action of the State is required. Some very eminent men from France admitted the want of better works for instruction both in elementary and physical geography.

It was the unanimous desire expressed at the Congress that the spirited example of Belgium should be followed up by assembling again in some other country, in furtherance of the object ("the advancement of geographical sciences") so auspiciously commenced. I would here venture to suggest, for the consideration of the Council, the desirability of organizing an international meeting of geographers, in combination with the Geographical Section of the British Association, at their next meeting, to be held at Brighton, the locality being easy of access and convenient for foreigners, besides being familiar to many of them. At the same time an exhibition of works appertaining to geographical sciences would be conducive to much emulation.

It only remains for me to testify my sense of gratitude for the very courteous and kind reception accorded to my colleagues and myself, as the representatives of this Society, by the Belgian authorities, and especially by Mr. E. A. Grattan, the British Consul for Antwerp.

ERASMUS OMMANNEY, *Vice-Admiral.*

To Major-General Sir Henry Rawlinson, K.C.B.,
and the Council of the Royal Geographical Society,
London.

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2. *Note on the Old Calabar and Cross Rivers.*

By CAPTAIN J. B. WALKER, F.R.G.S.*

THE Old Calabar River derives its name from the country situated on its estuary with which our countrymen maintain a traffic, so called by its discoverers the Portuguese. The native name is Efik. The regions watered by the Niger and by the Old Calabar River, doubtless from the easy access into the interior which they afforded, suffered more from the slave trade in former

* Captain Walker's original charts of these rivers are deposited in the Map-Room of the Society, and the valuable new matter they contain has been incorporated, at the request of the Hydrographer, in the new Admiralty Chart of the West Coast, Sheet XIX.—[ED.]

times than any other part of the continent. Mr. Wilberforce, in one of his speeches on the slave trade, states that more slaves were then exported from Bonny and Old Calabar than from all the rest of the coast; hence we find the Old Calabar region peopled by a great many minute tribes, mere handsful of people, and frequently at feud with each other. Efiat, at the entrance of the river, is said to have got its odd English name (Tom Shots' Point) from the circumstance that the chief of the little tribe of fishermen who inhabit the vicinity formerly made salt from sea-water; hence our countrymen called him Tom Salt, which name by the natives was transformed into Tom Shots, as it now stands. The river till its bifurcation is lined by mangrove-swamps on both sides: on the right there is in all probability communication with the Andoney, and through it with the Bonny branch of the Niger; but the region lying between it is yet unexplored. On the left side, through Backasey Gap, communication is no doubt had with the Rio del Rey. The Qua River has its rise in the Qua Mountains, a range stretching interiorly from the vast mass of Camercons. The small tribes on either bank—Efiat (Tom Shots), Usahadet (Bakasi), Iduä (Ekri Tobacco), Adön—are dependencies of Calabar. In the two last named the ground rises, giving soil for the oil-palm, and they have their oil-markets. These lower parts of the river are frequented by the Manati, and the Efiat people have a considerable trade with Calabar in shrimps and fish cured in smoke. The river divides about five miles below Duke Town, the chief town of the Calabar people. They were originally from Ibibio (Egbo Shary), driven out by tribal wars. The tradition is that they first settled on an island above Ikunetu, but the victors drove them from thence, and they scattered, as we now find them, to Mbiabo (Ekrikok), Adiabo (Guinea Company), Obutong (Old Town), and Ibokee, now comprising Okuritunko (Creek Town), and Atakpa (Duke Town). Ibokee first settled on a spot near Creek Town; but Old Town, being somewhat further down the river, endeavoured to monopolise the European trade, which made Ibokee divide. A number of families went beyond Old Town, and procuring land from the Aqua tribes, founded Duke Town, which soon grew to be the principal town. Further to cripple Old Town, the captains of the European ships at one time in the river united with the heads of Duke Town in an act of treachery, and massacred upwards of 300 of Old Town people when alongside their ships in friendly intercourse. The population of Calabar proper has been sometimes given at 60,000; but there is no information on which to form even an estimate.

The chief article of export is palm-oil. Palm-nut kernels of late have been exported in considerable quantities, and a small trade is done in ebony and ivory. The Calabar people act as merchants in the traffic; only a small quantity of oil is made by them, the chief quantity is purchased from the tribes immediately behind them. About 6000 tons are reckoned as the present annual export from the river.

The crocodile (two species) abounds in the river, and the principal land animals are the elephant, towards Akäyöng and Uwet, the leopard, the panther, and various smaller animals of that kind; monkeys and baboons, the grey parrot, and various species of antelopes. The hippopotamus has its *habitat* in the Cross River above Ikunetu; in the smaller branch, called the Calabar River, it is not found.

Pursuing this smaller branch, Inkpara is the farthest up of the Calabar villages, though the farms stretch up to Uwet. The Akäyöng and Uwet tribes lie above Inkpara, and further than the Uwet region no European has yet been. The river at Uwet is an inconsiderable stream, proceeding from the high land above that region. The principal branch is called the Cross River, from the idea formerly entertained that it might prove a branch of the Niger. It may have communication with the Niger through the Adoni, as noted above. Captain Becroft proved it an independent river by his ascent in the small steamer

Ethiope, belonging to the late Mr. Jamieson, an account of which was drawn up by Mr. King, the medical man on board, and was published at the time in the 'Journal' of our Society (vol. vii., page 195; vol. xi., page 189; vol. xiii. (1843), page 197). He proceeded upwards of 200 miles, and there met with rapids, but of no great strength, for he went beyond them in his gig; but his steamer was of small power, and the river was hemmed in on both sides by steep sandstone cliffs, so that he was afraid lest the *Ethiope* might be thrown against one or other of the banks. In after years he much wished to repeat and extend his explorations, but never found means to do so; so that the upper regions watered by the Cross River lie yet *terra incognita*. Ikorofiong, in Ekrikok, is the farthest up town belonging to Calabar, on the Cross River, but the farms extend a good way beyond it. The tribes on its banks, with whom they carry on the traffic, are Akäbä (Ekrimembo), Ibibio (Egbo Shary), including Itee, Enyong, and Umon (Boson), beyond which they do not proceed.

Up to Duke Town the mangrove predominates in the forests lining the river, though other trees begin to mix with it, but it terminates about Ikunetu. Above Ikunetu the Odüt Creek nearly forms a communication with the branch of the river.

In the Peninsula lying between the stream the Akäyöng Odüt, Ekoé, and Uwet tribes dwell. The Calabar people purchase oil from all these, but the Ibibio region yields by far the greatest quantity.

In 1845 the Calabar chiefs entered into a treaty with the British Government to abandon the slave trade, which treaty has been faithfully observed. They at the same time solicited that instructors should be sent to them in the industrial arts. By special invitation from these chiefs, the United Presbyterian Church located its mission, contemplated for the West Coast, in Old Calabar. The mission has stations occupied by Europeans at Duke Town, Creek Town, Ikunetu, and Ikorofiong, and it is extending its influence in the interior of the country by means of native agents. A school is established at each station and out-station. The native language is now written, and the missionaries have given therein the Scriptures and various other books, especially for school and church use. Though several of the European agents, unsuited to the climate, have fallen victims to it, yet it is found not at all deserving the bad name which it gets as an unhealthy region.

The seasons are two, as in regions of the same latitude, viz., the rainy and the dry seasons—what is called the smoke season on the coast occupying part of the latter. The rains in their regular fall commence in May and go off in October; July and August being the months of heaviest rainfall. They are preceded by occasional tornadoes from February to May, and also close with two or three tornadoes, commonly of less violence than those which precede them. The dry season begins in November; and in December, January, and February the smokes prevail. They differ much in density, some years being comparatively free of them. They are commonly most dense in the morning, and during their prevalence and in proportion to their density, the nights are cold and chill. This is considered the most unhealthy time of the year, and the natives in their nude state suffer a good deal during it. The year is thus pretty equally divided between the rain and the dry season. The rainfall in this region, though no accurate gauge has been yet made of it, is one of the greatest on the globe. No series of observations of the temperature has been taken. Inside of the house the common range is from 80° to 90° Fahr.; occasionally it is found as low as 72° and as high as 96°, but such extremes seldom occur.

3. Dr. R. J. MANN's *Observations on Sand Bars at the Mouths of South African Rivers; with Remarks on the Formation of Dams.* By C. R. MARKHAM, Esq., C.B., Secretary R.G.S.

AN experiment of a very interesting character is now being tried in the Neilgherry Hills, to ascertain how far *bunds* or dams can be raised for the purpose of forming artificial tanks or lakes, by means of the action of water in depositing silt. Mr. McIvor, the able and energetic Superintendent of the Chinchona Plantations in Southern India, developed and submitted a scheme for raising *bunds* by the silting process, and in 1869 the Madras Government sanctioned the trial, under Mr. McIvor's superintendence. The immense saving of labour and expense, in the event of this natural process being proved to be efficient, is obvious; and it appears that the idea had suggested itself to Mr. McIvor, from watching natural processes of a similar kind. A site was selected on the Koondah Mountains, at a point in a ravine, where a high and stable dam would have the effect of forming a large artificial lake covering several square miles; and the water was led on to the site, and made to deposit its silt by a simple method. In this way a dam, composed entirely of silt deposited by water, was raised to a height of about 80 feet, and a splendid sheet of water was formed behind it. But when the rains commenced in June, a tremendous storm raised the level of the lake until it began to overtop the embankment, and a catastrophe was the consequence. It is evident, however, that this accident was entirely due to an insufficient provision for the escape of surplus water, and not to any defect in the substance or composition of the dam. Indeed the very opposite was proved to be the case, for the silt had become so solid, that when the flood cut the dam down, perpendicular cliffs were left on either side of the opening, and large blocks were carried down the stream for more than half a mile, without being broken into fragments.

This application of the forces of nature to the use of man, to a use which in tropical countries is of the utmost importance to man's welfare, namely, the storing of water for irrigation, must have a special interest to the physical geographer; and one naturally looks round for analogous results of the action of water in the deposit of silt, under circumstances where man's ingenuity has been absent, and where Nature has worked in her own way.

Dr. Mann has furnished the following instance of such action.

Along the sea coast of Natal, including the recently annexed "No Man's Land," from the 30th to the 31° 30′ meridian of east longitude, not less than sixty-four rivers, of larger or smaller size, discharge themselves into the sea. Across the whole of these rivers distinct sand-bars are thrown up by the action of the sea. In consequence of there being several months of comparatively small rainfall, in the winter season of the year, these sandbanks from complete barriers across the mouth in the case of the smaller rivers in the dry season, which can ordinarily be traversed on horseback from side to side, but which are occasionally washed over by the sea, when there are heavy gales from the south. In such rivers a wide lagoon, extending from 2 to 3 miles inland, or even further, is formed in the winter season, in which the surface of the accumulating water continually rises higher and higher, until at last, and generally on the accession of summer rains, it bursts through the barrier, and opens a summer channel into the ocean. This channel is generally restricted within the breadth of a couple of hundred yards, and lies at one end of the sand-barrier, which elsewhere still continues to bound the lagoon. It is quite a common occurrence for *drifts* or fords of rivers, lying some 5 or 6 miles in from the sea, which are easily passed by horsemen and in waggons during the season of actual rain and flood, to become so deep in

the dry season, in consequence of the rising of the surface of the water in the barred lagoons, that they cannot then be traversed. The expedient of the traveller is to descend to the seashore, and to cross upon the sand-bar. When the channel is opened by the rains, the route returns to the upper ford. In the case of the larger rivers the sand-bar is never complete, and the lagoon is never completely formed. There is then always a clear and rather deep channel open, both to the outflow of the river and to the influx of the tide. The consistency of the sand-bars is so solid, and the silt is so well and closely driven down, that it becomes as hard as rock; and, on one occasion, it was actually cut out and quarried for building purposes.

In the action of these Natal rivers we find Nature working exactly as Mr. McIvor is striving to do in the Neilgherry Hills. The heavy surf of the ocean forces the fresh water to deposit its silt and form a bar; exactly as the artificial contrivance, invented for the purpose, forces the Neilgherry mountain stream to do the same thing. The rains of Southern Africa force a channel annually through the bar, just as the Monsoon storm cuts down the *bund* in the Neilgherries; and all that man has to do, to preserve the lake in its integrity, is to provide for the escape of the surplus water.

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4. *Report on a Journey through Mekran.* By Major E. C. Ross.

[Abstract by C. R. Markham, Esq., C.B., Secretary R.G.S.]

The region between Persia and India, which was traversed by Alexander the Great, and the coast of which was minutely examined by his General, Nearchus, has, from that time until the present century, been almost unknown to Europeans. Our knowledge of Beloochistan was confined to the routes of Pottinger (1810) and Grant (1811), and to the surveys of the coast by officers of the Indian Navy. But the recent operations connected with the establishment of telegraphic communication between India and England, and the Persian boundary questions, have led to the exploration by British officers of this region,—the Gedrosia of Alexander and the Greeks, now known as Mekran or Beloochistan. Colonel, now General Goldsmid, has taken the lead in the examination of this country, and has supplied geographers with much new information. Major Ross, Assistant to the Political Agents at Kelat and Muscat, has also traversed Mekran by a new and unexplored route, and the results of his journey are given in the present "Report on a visit to Kej, and route through Mekran from Gwadur to Kurrachee."

Leaving Gwadur on the 10th of September, 1865, he took the shortest route to Kej, the most important place in Mekran, accompanied by a Sepoy escort and by one Moola Doora, a confidential agent of the Naib of Kej. Mekran may be described as a series of parallel ridges, rising one above the other, from the shores of the sea of Oman, enclosing intervening terraces or valleys. The route of Captain Ross led, at first, over a barren and almost uninhabited tract at right angles to these parallel ridges; but after crossing a ridge of rocky mountains by a pass called Talar, there is a marked alteration in the character of the soil and country, and the pleasant green of the underwood and occasional patches of cultivated land were refreshing, after the barren ugly tract previously traversed. This district is known as the Dusht, a valley or plateau of great extent, containing much rich and fertile land, with a river, called the Khor Dusht, flowing through it, and enriching it with the alluvium which it brings down in certain seasons. It reaches the sea near Jewni, to the westward of Ras Pishkan. It is not, however, a continuous stream, at all times, from source to mouth. It is only during the rains that it

deserves the name of a river, and at other times, though starting and continuing for a considerable distance in the character of a flowing stream, the dry sandy soil of Mekran soon checks its course, and so absorbs its waters that the deeper pools alone remain. Cotton and several grains are produced along its banks.

The next parallel valley, north of Dusht, is that in which Kej is situated. The valleys are divided by a range of hills, through which the river forces its way, the same stream thus watering both valleys.

The Kej valley is a remarkable feature in the geography of Mekran. From the eastern extremity of the province of Kolwah two parallel mountain ranges extend unbroken to the borders of Persia, a distance of at least 250 miles in an E.N.E. and W.S.W. direction, preserving a distance between them of 12 to 20 miles. In the street-like valley thus formed most of the important places in Mekran are situated. The eastern portion, for 60 miles, is occupied by the province of Kolwah. Then follow Sami and Kej, and further to the westward are the considerable settlements of Nusserabad, Toomp, Mund, and Peshin. The authority of the Khan of Kelat extends as far west as Toomp. These long valleys are called *Dummok* in Beloochee.

Kej is generally mentioned as the capital of Mekran, but there is, in reality, no town; it should rather be called a "settlement," in which there are a number of forts and villages, extending for several miles, and including, under the general name, villages and forts, each bearing its distinctive appellation. This is the system throughout Mekran, and the settlements are called "*Abadees.*"

The *Abadee* of Kej is situated in the centre of the valley, between two lofty ranges of hills, about 12 miles apart. The fertile and inhabited part, which constitutes the *Abadee*, extends east and west about a dozen miles on either side of the river, here called Kej Khor, but lower down met with under the name of Dusht Khor. The whole breadth of Kej is not more than three miles; the rest of the valley, between it and the hills, being barren and stony land. Fine groves of date-trees line the banks of the river, and form the most prominent feature in the scenery; and *karezes*, or artificial watercourses, intersect the country in all directions, flowing through the groves and irrigating the fields which skirt them. The forts and villages are concealed among the date-trees, except the *Mirt*, or fort, which is the residence of the Naib, who represents the Khan of Kelat. The tradition is that the *Miri* was built by Bahman, the son of Isfundear, of the first Persian dynasty, who met his death in Kej. It is also related that Mekran was the penal settlement for Persian convicts in ancient times, from whom sprang the original Mekrani race. Major Ross was told that *Mekran* was from *Makar* (deceit), and means "the country of rogues."

The population of the Kej settlement is about 10,000. The chief product is dates, which are grown in large quantities and of good quality. Rice, barley, wheat, cotton, and tobacco are also grown, besides several kinds of fruit.

Captain Ross travelled eastward from Kej for about 20 miles along the same valley to Sami, and for 26 miles further, at which point he crossed the range of hills to the north, and reached another valley called Balgetter. He then turned south again and entered the district of Kolwah, the most fertile in Mekran. It possesses no stream, and the land is dependent for irrigation on the supply of rain, for the retention of which dams are constructed; yet barley is grown in large quantities, and flocks and herds are numerous. Thence the party travelled on, by Jow, to Bela, over a sterile tract, where there are no villages and no inhabitants. The province of *Las-Beyla* is here divided from the western provinces by a lofty well-defined range of mountains, the pass through them being excessively steep, and so narrow that laden camels are unable to pass. The construction of this pass is ascribed by the natives to the

famous Persian statuary Ferhad, who pierced the hill, they say, to win the beautiful Shireen, a daughter of a former king of Lus-Beyla. The supposed tomb of the lovers is situated close to the *lak*, or pass, and a pool of water is called *Koomb-i-Shireen*, or the Pool of Shireen. Close by it is the grave of the old woman who is said to have betrayed them both to death, and every Beloch who passes considers it his duty to cast a stone or piece of rubbish on it. A great heap has been thus collected.

After leaving the pass, the road emerges on the level plain, where stands Bela, the capital of the province. From this point Major Ross proceeded, by forced marches, to Kurrachee, where he arrived on the 9th of October. He fixed the latitude of several points on the route by sextant and artificial horizon, but was obliged to trust to dead reckoning for his longitudes.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 27TH, 1872.]

SESSION 1871-72.

Fourth Meeting, 8th January, 1872.

SIR BARTLE FRERE, K.C.B., VICE-PRESIDENT, in the Chair.

PRESENTATIONS.—*James Mowatt, Esq.; Dr. D. Brandis; Robert Jones, Esq.; J. H. McClure, Esq.; Edgar C. Harvie, Esq.*

ELECTIONS.—*Alfred Bellville, Esq.; Frederick Chambers, Esq.; William G. R. Elwell, Esq.; John Forrest, Esq.; John Thomas Gowlland, Esq.*, Navigating Lieut.; *Samuel Hill, Esq.*, M.D.; *Manoel da Gama Lobo, Esq.*, M.D.; *William Newton, Esq.; Captain John Moubray Trotter; Edouard Henri Léonard Willems, Esq.; Maximo Terrero, Esq.; Robert B. W. Wilson, Esq.*

ACCESSIONS TO THE LIBRARY FROM DECEMBER 11TH, 1871, TO JANUARY 8TH, 1872.—A Donation of Valuable Geographical Works from Mr. Kenneth R. Murchison, selected from the Library of the late President, Sir Roderick I. Murchison, has been received. The list contains the names of 256 authors of Books and Papers. Among the more important are the following:—'Opere dell' Abate Teodoro Monticelli.' Napoli, 1841. 2 vols. Memoir on the 'Città e de' Porti di Brindisi.' Napoli, 1833. 'Travels in the Ionian Isles, &c.' By H. Holland. 1815. 'Ordnance Survey of Londonderry.' By T. Colby. Dublin, 1835. 'Zoology of the Voyage of H.M.S. *Samarang*, 1850.' 'Astronomical Observations made at the Cape of Good Hope from 1834 to 1838.' By Sir J. F. W. Herschel. 1847. 'A Compendious System of Astronomy.' By M. Bryan. 1797. 'L'Altai Oriental.' Par P. de Tchihatcheff. 'Sul Moto Ondoso del Mare e sulle Correnti di Esso.' Pel Comm. A. Cialdi. Roma, 1856. 'Expédition Scientifique de Morée: Geologie et Mineralogie.' Paris, 1833. 'Asie Centrale.'

Par A. de Humboldt. Paris, 1843. 'Kosmos: einer physischen Weltbeschreibung.' Von A. von Humboldt. Stuttgart, 1845. 'Reise im Europaischen Russland in 1840-41.' Von J. H. Blasius. 1844. 2 vols. 'Les Steppes de la Mer Caspienne, etc.' Par X. Hommaire de Hell. Paris, 1843. 'La Russie dans l'Asie Mineure.' Par Paskevitch en 1828-29. 'Tableau du Caucase.' Par F. Fonton. Paris, 1840. 'Reise in das Petschoraland im 1843.' Von M. Kowalski. St. Petersburg, 1846. 'La Mère.' Par A. Giraud-Teulon. Paris, 1867. 'India and High Asia.' By A. Schlagintweit. 'Osten Siberiens, etc.,' 1843-4. Von Dr. A. Th. v. Middendorff. St. Petersburg, 1847. 'Der Nordostlichen Alpen.' Von A. V. Morlot. Wein, 1847. 'Reise nach dem Ural und der Kirgisensteppe, 1833-5.' Von Helmersen. St. Petersburg, 1843. 'Die Colonie Victoria in Australien.' Melbourne, 1861. 'Produits de la Colonie de Victoria.' 1861. 'Catalogue of the Victoria Exhibition, 1861.' 'Reise um die Erde.' Von A. Erman. Berlin. 'Portuguese Territories on the West Coast of Africa.' By Visconde de Santarem. 1856. 'Asie Mineure.' Par P. de Tchihatcheff. Paris, 1856. 'De la Formation et de la Repartition des Reliefs terrestres.' Vols. i.-iv. By F. de Francq. MSS. 1856. 'P. Cluverii Introductio in universam Geographicam.' 4to. 1711. 'Istoria e Geografica Descrizione delle antiche Paludi Adriane.' Venice, 1736. 'Venezia e le sue Lagune.' 1847. Published by the Commission of the Consiglio Comunale, Conte Giovanni Correr, Presidente. 3 vols. 'Antichita Siciliane Spiegate.' Opera del D. G. M. Pancrazi. Napoli, 1751. 2 vols. folio. 'Travels in Greece and Italy. By C. S. Sonnini. 1801. 'Travels in Hungary, etc.' By Robert Townson. 1797. 'Marchand's Voyage Round the World in 1790-2.' 2 vols. 1801. 'Voyages de M. P. S. Pallas dans l'Empire de Russe.' Paris, 1793. 'Ancient and Present State of Scilly.' By W. Borlase. 1756. 'Botany, Geology, and Zoology of Northern California and Oregon.' By J. S. Newberry. Washington, 1857. 'Reise nach dem Ural.' Von Gustav Rose. Berlin, 1837. 'Naturalist on the Amazons. By H. W. Bates. 1863. 'The Earth and its Mechanism.' By H. Worms. 1862. 'Meteorological Phenomena.' By G. Hutchinson. Glasgow, 1835. 'Magnetic Isoclinal and Isodynamic Lines in the British Islands.' By E. Sabine, 1839. 'Description de l'Observatoire de Poulkova.' Par F. G. W. Struve. St. Petersburg, 1845. 'Le Canada.' Par J. S. Hogan. Montreal, 1855. 'New Zealand.' Von Dr. F. von Hochstetter. Stuttgart, 1863. 'Leben und Scriften von Dr. K. E. v. Baer.' St. Petersburg, 1865. 'Voyages dans les Alpes.' Genève, 1786. 'Mittheilungen aus J. Perthes Geographischen Anstalt, etc.' A complete set to date.

Par P. de Tchihatcheff:—1. 'La Paix de Zurich,' Paris, 1859; 2. 'Italie et Turquie,' Paris, 1859; 3. 'La Turquie-Mirès,' Paris, 1861; 'Miscellanea,' 1 vol. of Papers.—'Hohenmessungen in der Rheinprovinz.' Von Dr. H. v. Decken. Bonn, 1852. 'Reise der Oesterreichischen Fregate *Novara* um die Erde, 1857-1859.' 18 vols. bound, containing *two hundred and two* Memoirs relating to Geographical Subjects. 'On a Portion of Dunkhun, East Indies.' By Col. W. H. Sykes. 1836.——'First Settlers on the Oregon and Columbia Rivers.' By A. Ross. 1849. Purchased. 'Portuguese Settlements in China.' By A. Ljungstedt. Boston, 1836. Purchased. 'Physical Research in India.' By G. Buist. Bombay, 1852. Purchased. 'Voyage from Boston to West Coast of Africa, 1853.' By J. A. Carnes. Purchased. 'History of the Colonies of the British Empire.' By M. Martin. Purchased. 'Scinde and Affghanistan, 1838-41.' By G. Buist. Bombay, 1843. Purchased. 'Ceylon and Continental India.' By W. Hoffmeister. 1848. Purchased. Murray's 'Handbook for Constantinople.' 1871. 'Republic of Paraguay, its Position and Prospects.' 1871. Presented by Senor Terrero. Republic of Paraguay, its Constitution.' 1871. Donor B. Cracroft, Esq. 'New Route of Commerce by the Isthmus of Tehuantepec.' By S. Stevens. Donor the author. 'Hydrographical System and Freshwater Fish of Algeria.' By R. L. Playfair and M. Letourneux. Donor Colonel R. L. Playfair. 'Die Polar Expedition von A. Weyprecht und Julius Payer.' Wien, 1872. 'Rude Stone Monuments in All Countries: their Age and Uses.' By J. Fergusson. Donor the author. 'Travancore and its People.' By S. Mateer. 1871. Purchased.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING OF DECEMBER 11TH, 1871.—Map of London, showing the Metropolitan Railways, Tramways, and Improvements for 1872. Published and presented by E. Stanford, Esq. Oceanic Telegraphic lines, showing Deep-sea Sections, to illustrate a Paper by Captain S. Osborn, R.N. Presented by the author.

LIVINGSTONE SEARCH AND RELIEF EXPEDITION.

The CHAIRMAN said the Fellows of the Society would have become aware, from the notices which had been issued, that the Council of the Society thought that immediate action ought to be taken with a view to afford assistance to Dr. Livingstone, who, throughout his career as a discoverer, had been intimately connected with the Society. Probably it had occurred to some that the action thus taken in the matter was rather sudden, and that there was

hardly anything in what was immediately before the public to account for it. He therefore desired to offer some explanation of the facts which were laid before the Expedition Committee and the Council at their last meetings. It was nearly two and a half years since anything had been received in the shape of a written communication from Dr. Livingstone. At that time he described himself as in great want of everything necessary to enable him to travel successfully in Africa, and he was even reduced to borrowing the two sheets of paper on which his communications were written. Her Majesty's Government and the Society at once took all the steps in their power to forward to him the supplies he needed, by the means which had previously been found most effective. Up to that time he had not got beyond the reach of ordinary trade communication, and by sending supplies by native parties who were in the habit of travelling between Zanzibar and the interior, it was in the power of the Consul there to insure their reaching Livingstone. Shortly after, however, a very untoward change came over the relations of some of the tribes intervening between the traveller and the coast, and disturbances took place which, without in any way affecting him personally, prevented a portion of the supplies reaching him. This was at present, as far as was known, the state of the case regarding him. It might be asked, "What sort of evidence is there that he is still alive and active in the pursuit of the great object of his existence?" With regard to this, it might be said with more certainty than usual in the affairs of this life, that no news was good news. Various rumours had reached England at different times, and they all had this much of evidence of truth in them, that they all described him as following out that great plan which he had laid down for himself when he left England. His purpose was not the following out of any one particular river, or of one particular route, but to discover the boundaries of the great Nile Basin. As far as the scanty notices received could be depended upon, he had been tracing the Nile Basin from time to time, and returning to a central point, where he hoped to meet the supplies which would enable him to go further, and which it must now be sorrowfully admitted have probably never reached him. Another question lately raised was, Why we should suppose that he was in need of anything? The answer to this was that, as far as any positive evidence went, he was in the interior with some remains of health and strength, and if so, certainly with his spirit still unbroken, but absolutely without the means of moving. Two years and a half ago he had not the means of writing despatches to the coast, he was without

a single dose of quinine to relieve him, should he be suffering from the burning fevers of the country; he was without any of the supplies which might enable him to move, or even to live, in anything like the state in which it was alone possible for a civilised man to exist to any purpose in those regions. That being the state of the case, the Council of the Society felt that it was impossible for them to sit quietly in England, and make no effort to succour their great traveller; that it would be to the last degree disgraceful to the Royal Geographical Society, not only as a scientific body, but as a collection of Englishmen, if they allowed some casual traveller five or six years hence to visit the country, and be able to say that Livingstone had perished because no effort was made to send him supplies. The question then was, Was it practicable to forward to him the things he needed with any chance of their reaching him? There was nothing to prove that at this moment, beyond the innumerable trials to a man's patience and fortitude, there was any insuperable difficulty to an Englishman, travelling in the same character as Livingstone, penetrating to any distance in the interior. If he went to steal his fellow men, or for any selfish or small purpose, then let him prepare for disappointment; but if he went in the spirit in which the greatest travellers had laboured, then it appeared to be simply a question of fortitude and endurance for him to reach Livingstone, and bring back news of him to relieve the anxiety felt by his fellow countrymen. Though but a short time had elapsed since the announcement by the Council was issued, sufficient had occurred to show that the call had not been made to unwilling ears. It was no very small sum which was needed to carry out sufficiently such an expedition as was necessary; but, as far as was known, all the supplies could be obtained at Zanzibar by those who were there on the spot with Dr. Kirk, and be ready against the expedition reached that place. In a short time a steamvessel would proceed direct to Zanzibar *viâ* the Suez Canal, and it would be quite possible for the person selected to lead the expedition, to depart by that vessel, and on his arrival at Zanzibar, find everything prepared for him, so that he might start immediately for the interior. The only difficulty was that of procuring funds, and selecting the man. With regard to the latter matter, the Council had appointed a Sub-committee to receive applications from volunteers, for they felt it would be a mistake to rely on any but voluntary exertions. In the few days that had already elapsed, some forty applications had been received from gentlemen desirous of leading the expedition, and the only difficulty was to select the best. He had no doubt that after the Sub-com-

mittee had examined the testimonials, and selected the best man in their opinion, the Society would feel sure that the selection was a judicious one. With regard to the pecuniary question, the Council proposed to grant 500*l*., and subscriptions to a considerable amount had already been promised. A question had been raised as to the desirability of leaving the relief to Sir Samuel Baker; but latterly the reports received from Egypt showed that Sir Samuel had only penetrated as far as he had hoped to have reached nearly a year ago, and at the nearest he must be some 700 miles from where Livingstone was supposed to be. Under these circumstances, they might justly be accused of sitting down with their hands folded, if they said, "We will leave Livingstone to be relieved by Baker,—till either he gets to Baker, or Baker gets to him." These were the motives which had led the Council to take prompt action in this matter.

Mr. WALTER BRODIE, after referring to Mr. Young, who headed the last expedition in search of traces of Livingstone, asked if the Government were going to contribute towards the expenses.

The CHAIRMAN said Sir Henry Rawlinson made an application to the Government as soon as the resolution had been come to by the Council, but the time that had elapsed was not sufficient for any answer to be received. However, there could be no doubt that among the present members of Her Majesty's Government there was an earnest desire to do everything their duty permitted, in the way of assisting Dr. Livingstone, and no better proof of this could be afforded than the fact, that during the last autumn the Prime Minister submitted to Her Majesty the names of the daughters of Dr. Livingstone as proper recipients for 300*l*. from the royal bounty. But it must be remembered that Her Majesty's ministers had to act as trustees, and it was their duty to do with the nation's money only what the nation desired. They would therefore be guided in their action by what they thought would be approved by the nation at large.

Mr. W. BRODIE suggested that one of Her Majesty's steamers might be employed to assist the expedition. Everything possible ought to be done to find out if Dr. Livingstone was alive or dead, and to prevent the provisions sent to him from being wasted and lost by being entrusted to natives.

The CHAIRMAN said, only eighteen months ago Her Majesty's Government had voted 1000*l*. to assist in sending supplies from Zanzibar to Dr. Livingstone, and part of that sum was still available.

A FELLOW suggested that the Members of the Council should use their parliamentary influence in urging the Government to assist the expedition.

A FELLOW asked what was the amount estimated to be required to carry out the expedition. He recommended that a subscription list should be opened among the members of the Society.

The CHAIRMAN said it would not be safe to send any expedition until a minimum of 2500*l*. had been collected, and no doubt a considerable sum beyond that would be required. A subscription list had already been opened, and many members of the Society had put down their names. No doubt others would be willing to follow their example.

The Rev. H. WALLER was sure that the proposed expedition was a step in the right direction. It was not too much to expect that, after a silence of two years and a half, the utmost should be done to find out the real position of such

a man as Livingstone. It had been said by some that he was quite capable o taking care of himself, and no doubt if any man could take care of himself in Africa he could; but after all he was but human, and his constitution was to a certain extent impaired by the remarkable journey he formerly took across the continent. He had, too, never failed to impress on those who were with him the necessity of carrying certain medicines about with them, while he had frequently declared that it was impossible for a European to travel any length of time in the interior of Africa without something better to fall back upon than native food. He must also have been for some time without boots or shoes, and under such circumstances he must have suffered the greatest privations. The late Lord Clyde used to say that a bamboo could be procured anywhere in tropical countries, but to make it into a spear the steel head at the top of it was required. So any expedition going into the interior of Africa without a European at the head, as the steel tip, would never push through the difficulties of a search like this. He never had expected much result from the previous expeditions, but he believed the proposed one would accomplish the desired end. It had been said, not only that Livingstone could take care of himself, but that it would be paying him, to a certain extent, an equivocal compliment to go in search of him; but anyone who reached him with a despatch, bearing the signatures of such dear friends as Sir Roderick Murchison and Sir Bartle Frere, would be received with the sincerest love and regard.

Mr. FRANCIS S. DUTTON recommended that in the choice of a leader for the expedition the Council should not confine themselves to the applications made to them, but should reserve to themselves the liberty of going beyond the circle of volunteers. Ex-Governor Eyre, the distinguished Australian explorer, would be eminently fitted for directing the proposed expedition, and if the Council could prevail on him to accept the post he would no doubt carry the enterprise to a successful issue. If undertaken at all, the expedition should be on such a scale as to leave no possible room for doubt hereafter.

Dr. PURCELL thought the expedition ought not to be limited to a search for Dr. Livingstone, but should include in its object the exploration of that part of Africa as yet unknown.

The CHAIRMAN reminded the Society that in a matter of this kind it was necessary to any efficient action that the choice of agents should be left to a comparatively small body whom the Society could trust. It would, too, be hardly just to any great traveller, some years after his achievements in travelling, to call him out of his retirement, when perhaps he was greatly in need of rest. With regard to the other question, he was of opinion that the Society would be wise to limit itself to one thing at a time, and he believed the Council were unanimous in wishing to confine the objects of the expedition to the search for Dr. Livingstone.

The following paper was then read:—

On the Somali Country. By Captain S. B. MILES.

[ABSTRACT.]

CAPTAIN MILES, who recently gave an interesting account of a journey into the interior of Yemen in company with M. Munzinger, has this year visited the portion of the African coast in the vicinity of Bunder Marayah, and has made an excursion into the interior as far as a valley called the Wady Jaeel. His valuable report is accom-

panied by a vocabulary of Somali words, and a list of useful trees and plants with their botanical names.

Captain Miles reports that Bunder Marayah, in latitude 11° 43' N., is the chief fort of the Mijjertheyn, or Majartein, tribe of Somalis. It is situated at the foot of a range of hills bearing the same name, which rises, about a mile behind the town, to a height of 4000 feet. The town extends along the beach for nearly half a mile, and contains upwards of 200 houses. The permanent population is only some 600 or 700; but during the trading season, when the *kafilas* arrive from the interior with gums and other produce, and the Arab merchants come across from the opposite coast, this estimate must be quite doubled.

The ranges of hills, of which Jebel Marayah forms part, correspond almost exactly, in their formation and composition, with those in some parts of the opposite coast of Arabia. They are of the same cream-coloured limestone, with sandstone, shale, and quartz, and the strata have the same confused appearance. The low, narrow, maritime plain, in which Marayah lies, extends eastward until it meets the spur forming Ras Feeluk. The soil of the plain is principally coral, with sand and fragments of rock washed down from the hills. It is well wooded with acacias and mimosas, and a few date-palms have been planted near the town. The Wady Hakêr—the Rio de San Pedro of the Portuguese—about 2½ miles to the east of the town, is fed by many torrents, and forms the natural pass into the interior. The chain of hills is described as extending three days' journey into the interior, when the country slopes down southwards and eastwards until it merges into an extensive hilly plateau, well wooded and grassy, and full of large game. No corn is raised and but little eaten, the people being purely nomadic, subsisting on their flocks and herds, and moving about for the convenience of pasturage. The country is but thinly peopled, and there are few permanent villages, the Mijjertheyn being amongst the poorest of the Somâl, and not possessing the countless flocks of sheep owned by the Gullêdh tribes.

The commerce of this part of the coast is considerable. The exports are frankincense, gum-arabic, mulij (fruit of the *doun*), indigo, and mats; for which cloth, dates, rice, jowaree, and metals, are imported in return. There are six large *buglas*, belonging to these ports, trading across the ocean to Bombay, besides smaller craft that go to the opposite coast.

The Somâl divide gums into two classes—sweet and bitter: to the former belong gum-arabic, mastic, "lubon," "mayeti;" and to the latter myrrh, "bodthai," and others. They have at least

three species of acacia producing the Sumugh or gum-arabic, and they are all very abundant. The "bodthai" is a gum of peculiar quality. The tree is a thorny acacia, not unlike the babool, but with a smooth bark. The gum issues in a thick milky mass, and when dry it becomes brittle. The *lubon* tree, producing the Olibanum or frankincense, which is called by the Somâl "Beyui," grows only on the limestone ranges of this and the opposite coast. The beautiful and singular appearance of this tree, with its tapering stem and crimped foliage, attached to the smooth surface of the marble rock by its large white bulbous mass, and dotting the tops of the hills, where often no other verdure is to be seen, is very striking. There are four different kinds of the tree, producing two distinct kinds of gum. The first and best kind, called *bedwi* or *sheheri* (*luban bedowi* of Cruttenden), comes from the Mohr Add and Mohr Madow: the second kind, called *mayeti* (*luban meyti*), is produced by the Yegaar. Numbers of the Somâl go across to Hadramaut for the purpose of gathering the frankincense, paying the Arab tribes there for the privilege, the latter never attempting to collect it themselves. The Somalis usually settle there, selling the gum at Moculla, until they have amassed a competency. The Arab "*luban*" is considered inferior to the African, which is termed "*asli*" by the Arabs. Probably the tree was imported into Arabia, with the myrrh-tree, in very remote times. The season for gathering the gum lasts for four months—from May to September; the trees may be gashed any number of times without injury, provided that rain falls soon after. The gum is gathered fifteen days after the tree is cut, as it has then ceased to exude, and the bark, which heals rapidly, is again gashed. The trees, though growing wild, are carefully watched by the Somâl; and, in some cases, they are said to plant and propagate saplings in their fields.

Captain Miles thinks it probable that the Somâl are descended from a number of Arabs who immigrated into the country, and, mixing with the Galla inhabitants, soon multiplied and drove back into the interior all those who refused to conform to their religion, and thus occupied the country they now hold. Their language and religion both support this hypothesis. The former is composed almost wholly of words derived either from the Arabic or Galla tongues, the latter predominating, and their traditions universally refer to Arab ancestors, whom they hold in great veneration. They assign a period of between four and five centuries to this immigration, which was probably from Hadramaut, and they speak with pride of the readiness with which the Moslem faith was embraced.

The name of Somâl, and the time when they first began to be called by it, still remain in obscurity. The root of the word in Arabic is, in one of its significations, "lofty hills covered with trees," and this name may have been applied to the country by the Arabs. But it does not appear to have been so known to the ancient writers, and Captain Miles suggests the possibility of its being an anagram of the word *Mosyllon*, the ancient name of Berbera or Kurrum: for the whole region, as far as Cape Guardafui, was called the Mosyllitic coast. The Somâl distinguished between the two sides of their country, by the terms *Burri* (the eastern) and Gulbêdh (the western). Like the races north and south of them—the Afar and Sowahili—the Somâl are of the Shafeea school of Moslems. The Mijjertheyn is the only tribe under the sway of a sultan, the others having a chief, called *Ogass*, to reign over them.

There are three outcast tribes, named Tomal, Midgân, and Ebir. The first are blacksmiths exclusively, making arrow and spear heads, fish-hooks, and such-like requirements of the people. The second are usually servants or herdsmen; and the third are the Pariahs of the land, and professional jugglers.

The Somâli coast, from Marayah to Alloola, has three towns not laid down on the charts; namely, Gurso, Kesulli, and Habo. From Cape Guardafui to Ras Hafoon the coast is bleak and sterile, with two or three fertile valleys, and is very thinly peopled; but on the top of the square table-land of Hafoon there are extensive pastures, on which camels, cattle, horses, and sheep, are grazed in the season.

The eastern point of the country is formed of a series of tolerably well-wooded plateaux, rich in valuable gums. Captain Miles remarks that a very unnecessary puzzle has been made of the name given to this point or horn by the Portuguese—Cape Guardafui. Bruce insisted that it should be called Gardepan, or the "Straits of Burial," and others have derived it in ways equally fanciful—even the accurate Cruttenden was misled. It is, in fact, simply the native name for this part, and is the only one known to the inhabitants—Girdif or Girdifu. The only Europeans who have ever traversed this point were some of the troops belonging to the Bombay column of the army of Egypt in 1801. The transport, in which they were returning to India, having been wrecked near Ras Hafoon, they succeeded, after great hardships, in making their way along the coast to Bunder Alloola, where they were taken off, two months after.

The ancient geography of this coast, as given in the Periplus of the Erythræan Sea, has become more clear and intelligible since

our knowledge of it has increased, and we have had the accurate surveys of the Indian Navy to refer to for its elucidation. The first place mentioned in the territory now occupied by the Somalis, by the author of the 'Periplus,' is *Mundus*, which Captain Miles considers to be Zaila, on account of its description as a safe anchorage under the protection of an island—a circumstance that suits Zaila alone. The chief emporium on the coast, however, is said to have been Mosyllon; which Captain Miles places at Berbera. Hafoon is identified with Aphonè of the 'Periplus,' both from the similarity of the name, and the fact of its being called an emporium, a character it still deserves, as the whole produce of the valley of the Jaeel is brought here. Cruttenden, who compares the fair at Hafoon to that of Berbera, testifies to the number of merchants resorting to it, and to the value and briskness of the trade carried on.

The luxuriant vegetation of the valley of Jaeel having been described to Captain Miles in glowing terms, he hired a camel and started for it one evening in company with five Somalis. The road passed over a sterile plain, thinly grown here and there with acacias, until it reached the Wady Jaeel. The wady appears, at a distance, like a bright green streak in a brown and hilly plain, and looks singularly pleasant and refreshing. The banks are high and precipitous, and the bed is in no place less than 700 yards wide, showing that a very considerable body of water is carried down in the monsoon. The bed is extremely well wooded with some large trees, especially in the centre, where the ground is high, forming islands in the flood. The wild date and doun were particularly abundant, the fruit and leaves being an important article of commerce. The people were very friendly, and appeared quiet and industrious, but miserably poor. The men were employed in splitting, drying, and stringing *mulijs* (doun fruit), and the women in mat-weaving. Their mat-huts were scattered along the valley, with thorn *kraals* for the few half-starved sheep and goats. There is no cultivation, and the fruit of the wild date seems the staple article of food. The river is said to have been the resort of wild elephants until three years ago; since then they have only re-appeared once. Captain Miles travelled up the valley for forty or fifty miles.

The Burel Somâl country, which has been described in this Report, is very interesting, and Captain Miles considers that there are not many which offer greater attractions for research and greater facilities for exploration to the traveller. It is true that we have had a few glimpses of it, and the writings of Cruttenden, Rigby, and others, have left little to be gleaned superficially; but how

little we know of the interior! and of the tribes beyond the seaboard absolutely nothing! The geography, resources, and productions of the country; the condition, distribution, and inner life of the people; have all yet to be written, and offer a wide field for inquiry to the first European who shall visit them.

Captain Miles's Report on the Somali country is dated at Aden, on April 17th, 1871.

This recent visit to the Somali country has furnished some additional evidence on the subject of the frankincense or olibanum of commerce, which has been so ably and exhaustively discussed by Dr. Birdwood in the 'Transactions of the Linnean Society.' Early writers all described the precious incense as being obtained from Arabia and the Somali coast. But Bruce, who said that the frankincense country extended from Abyssinia to Cape Guardafui, described a tree called *Angouah* (the *Boswellia papyrifera* of Richard), as yielding a gum much resembling frankincense, and growing in the valley of the Takazzé in Abyssinia. In 1807, also, Colebrooke's description of the Indian plant (*Boswellia thurifera*) led to the theory that the olibanum of commerce was entirely derived from India. But the visits of Wellsted, Cruttenden, and other officers of the Indian Navy, to the Somali coast, and of Dr. Carter to Arabia, fully establish the existence of the true frankincense-trees of commerce in those countries. Captain Miles's account of the tree and its product, in the present Report, agrees very exactly with that of Cruttenden.

Dr. Birdwood has finally settled the controversy which has gone on for ages, respecting the trees from which frankincense is derived. He divides the Boswellia genus into five species; three of which, and the only ones which yield frankincense, being first described by himself:—

I. *Boswellia Carterii*, the kind found by Dr. Carter in Arabia, but also growing in the Somali country. It is the *Luban Bedowi* of Captain Miles's paper, yielding *Mohr Madow*.

II. *Boswellia Bhau Dajiana*, a species from the Somali coast, yielding the *Mohr Add* of Captain Miles. It is called after an eminent antiquary and physician in Bombay.

III. *Boswellia papyrifera*, the Abyssinian kind, first mentioned by Bruce, which yields none of the *olibanum* of commerce.

IV. *Boswellia thurifera* of Colebrook, the *B. serrata* and *glabra* of Roxburgh. An Indian kind, which also yields no olibanum.

V. *Boswellia Frerana*, the kind described by Captain Miles as

Yegaar, and as growing near Bunder Marayah. It is the source of the *Lubon Maitee*, as stated by Miles.

Dr. Birdwood believes that the use of frankincense and other sweet odours, in religious rites, originated in sanitary precautions. They do not merely mask bad smells, but correct them; they drive away vermin, and refresh the spirits from the depression which they fall into, in crowded places like churches. The churches in Bombay are infested by mosquitos, the ugly and irreverent punkas now in use are of no service; and the only remedy is the immemorial and most beautiful rite of burning frankincense.

The bulk of the olibanum of commerce is derived from the Somali coast; and it appears, from what Captain Miles tells us, that even the smaller quantity derived from Arabia is not gathered by natives of the country, but that the Somalis of the opposite coast go over for the purpose of collecting it, paying the Arab tribes for the privilege. The trade in these precious gems from the Somali coast is the most ancient on record. The produce of the *Boswellia* trees is not only frequently mentioned by the Latin poets, proving the universal trade of the nations of antiquity for centuries in frankincense; but it is also given as one of the ingredients for the holy perfume, in Exodus (xxx. 34–36). For this, among other reasons, the Somali coast is a country of peculiar interest, and one which, both for its own sake and for that of the unknown lands which lie beyond it, is well deserving of the attention of those who may hereafter engage in geographical exploration.

General RIGBY said Captain Miles's paper was important, not only in a commercial, but also in a political point of view. The Somali country was the district from which so many valuable gums were chiefly obtained. Politically it was important, as showing that now for the first time Englishmen, who had long occupied Aden, were able to penetrate this north-eastern part of Africa. Thirty years ago it would have been death to any European to have attempted such a journey as that which Captain Miles had performed. The whole of that vast tract of Africa was still a blank upon our maps: the interior was a thickly populated and very productive country. The incense-producing district extended along a range of limestone mountains for 150 miles, and to a great distance into the interior. Wady Marayah was known to be very rich indeed, containing the finest trees producing frankincense: it was occupied by the Majartein Somalis, who were a trading race, very amenable to civilization. From time immemorial natives of India had gone from Cutch and Surat, at the termination of the north-east monsoon, and settled at the east end of Africa for the purchase of gums, frankincense, and myrrh, from the natives. Formerly, when any vessel was wrecked on that coast, the survivors suffered great privations from the hostility of the natives; and now that the opening of the Suez Canal had greatly increased the commerce of the Red Sea, it was of great importance to secure their friendliness. The great Somali race extended right down to the Equator; and although there was no definite boundary between the Somali country and that of the negroes, there was a point near the Equator where the one race was some-

what sharply defined from the other. The Somalis were a long-haired race, with Semitic features. They were very enterprising, fond of trade, and did not mix with the negroes in any way whatever, but rather looked upon them as an inferior race. He never found a word common to the two races. Unlike Captain Miles, he thought the Somalis were originally an African people, as they inhabited such a vast extent of country, and had a language entirely different from Arabic, Gallas, or Abyssinian.

In answer to a question regarding their religion, General Rigby replied that they were Moslems, and were very strict indeed in the observance of their religious duties.

The Rev. G. P. BADGER said that he agreed with Captain Miles that the Somâlis were the descendants of Arabs who had settled on the coast of Africa and intermarried with the people of the country. Captain Cruttenden, in his admirable reports, mentions the tradition existing among them that their forefathers had come over from Hadhramaut, and that the graves of the principal immigrants were still revered by the inhabitants. There could be little doubt that intercourse had been carried on between the two coasts from very remote times, for Captain Miles's careful transcript of the Himyaritic inscriptions at Hisn-Ghorâb recorded the arrival there of a large colony of Abyssinians from the region about the Lake Hâîk. With regard to the name "Somâly,"—supposing it to be of Arabic origin,—the predominant idea of the etymon was "dryness," "aridity," which was the characteristic feature of the country, although it produces so many incense-bearing trees. "Saumal," or "Somal," one of its derivatives, meant "dry-skinned," and, judging from the fact that the Somâlis expend a great quantity of oil in greasing their bodies, it is presumable that the term was aptly applied! He did not think that Captain Miles had given any additional information respecting the frankincense. About fifteen years ago, Dr. Vaughan, formerly Port Surgeon at Aden, had drawn up a long descriptive catalogue of all the gums and shrubs which had been brought over to that settlement from the Somâli country, and it was published by the Pharmaceutical Society of Great Britain, with some valuable notes. He did not agree with Captain Miles that the greater part of the frankincense used came from the Somâli country, but believed that it was still obtained from the district north of Hadhramaut. This gum was highly prized in olden times. Pliny gives a detailed account of the manner in which the rough frankincense imported into Alexandria was garbled there. "They need not to set any keepers for to looke unto those Trees that be cut, for no man will rob from his fellow if he might so, so just and true are they in Arabia. [How the Arabs must have changed since Pliny's time!] But believe me, at Alexandria where Frankincense is tried, refined, and made for sale, men cannot look surely ynough to their shops and work-houses, but they will be robbed. The workman that is emploid about it is all naked, save that hee hath a paire of trouses or breeches to cover his shame, and those are sowed up and sealed too, for feare of thrusting any into them. Hookwinked he is sure ynough for seeing the way too and fro, and hath a thick coife or maske about his head, for doubt that hee should bestow away in mouth or eares. And when these workmen be let foorth againe, they be stripped starke naked, as ever they were borne, and sent away." (Pliny's 'Natural History,' *Holland's translation*. London, 1601, tom. i. p. 367.) Frankincense is much less esteemed now. Dr. Birdwood mentions its value in correcting bad odours; but, according to a Muslim author of the 13th century, Zakariyya-bin-Muhammad, el-Kazwíny, who rivals Solomon as a naturalist, its virtues are curative of moral as well as physical disorders. He describes the *Lubân*, or frankincense, as "a thorny shrub, not more than two cubits high, growing in the mountains of Shehr, of 'Omân, having leaves like the myrtle, and the gum of which is called *Kándar*. The gum is taken from the upper parts of the

stem, and being left to settle it becomes the *Kándar*, and is also called *Lubân*. Whosoever perseveres in chewing it, his heart [or his stomach] will be purified, and he will be able to recall to mind what he has forgotten. It also cicatrises fresh wounds and prevents sloughing. Applied, with duck's grease, to itch, it causes it to disappear. It also invigorates the intellect, and arrests bleeding at the nose." (*'Ajâyib-el-Makhlukât.* Gottingen, 1848.)

Fifth Meeting, 22nd January, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*William Frederick Alphonse Archibald; Peter Henry Berthon; Clifford James Brookes; Lieut. Reginald Beavan; James Alexander Christie; Colonel George Earl Church; Lieut. William Collingwood; His Highness Maharaja Dhuleep Singh; Charles F. T. Drake; Frederick Ralph Hart; Richard Helme; Joseph Palmer; Robert Charles Paxton; John H. Puleston; Henry Robinson; Abraham Scott; John Watts; Thomas Westall; John Peter Wilson.*

ACCESSIONS TO THE LIBRARY FROM JAN. 8TH TO JAN. 22ND.—'North China Campaign of 1860.' By R. Swinhoe. Donor K. Murchison, Esq. 'Two Months in Palestine.' Donor the author. 'Solucion de la Cuestion de Limites entre Chili e Bolivia.' Por J. A. Torres. Santiago, 1863. Donors the University of Chili. 'Camp Life and its Requirements.' By H. A. L. 1871. Donor the author. 'Proverbia Communia Syriaca.' By Capt. R. F. Burton. Donor the author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING, JANUARY 8TH.—The Public Schools Atlas of Modern Geography, in thirty-one maps. By the Rev. George Butler, M.A. Presented by Messrs. Longmans and Co. Sketch of Eastern Bengal and Burmah, with the Country of the Looshai Expedition. Presented by the Editor of the 'Arakan News.' Map of the Eastern British Frontier, bordering on Burmah and Munneepoor. Map of the Country round Delhi, showing the position of the Camps of Exercise. Compiled in the Surveyor-General's Office, Calcutta, 1871. Presented by the India Office, through Mr. C. R. Markham, C.B. Map of the Pongo de Manseriche (Upper Marañon). By J. Smales, Engineer to the Peruvian Government. Presented by W. Chandless, Esq.

The PRESIDENT introduced to the Meeting Lieutenant Llewellyn S. Dawson, R.N., as the officer who had been selected to lead the expedition into Africa in

search of Dr. Livingstone. He also announced that Dr. Livingstone's second son, Mr. Oswald Livingstone, had volunteered to accompany the expedition, and that his offer had been accepted by the Council.

Mr. C. R. MARKHAM read the following Paper on the proposed Livingstone Expedition:—

The Livingstone Search and Relief Expedition.

LIVINGSTONE, the great traveller whose name is famous throughout the civilised world, and in whose welfare all Britons feel the warmest interest, needs our aid. It has not been the wont of the people of this country to let such need remain uncared for. When our great explorers have gone forth to achieve famous discoveries, they have done so in the sure faith that, if their difficulties became insurmountable, their countrymen would send them aid. When have they been disappointed? Not when our veteran Vice-President, Sir George Back, forced his way down the Great Fish River to the Frozen Ocean in search of the Rosses. Not when expedition after expedition sailed in search of Franklin and his gallant followers; nor when the search was continued by McClintock, with private means, in spite of discouragement from the Government. Not when help was sent, with unstinting hand, to Speke and Grant. Not when our late beloved President, firm and steadfast in his loyal friendship, sent Mr. Young to succour our lost traveller Livingstone, or to ascertain his fate. Sir Roderick has left his spirit among us, and the Geographical Society, the honour and reputation of which he loved so well, will not fail in its duty now.

It is no ordinary traveller who needs our aid. It is no ordinary discovery that will be disclosed to us, and perpetuated by his safety. Livingstone, since he landed in Africa in April, 1866, has performed one of the most remarkable journeys this age will have to record. In the first seven months he discovered the whole course of the Rovuma, traversed the mountain range which encloses Lake Nyassa on the east, and reached the southern extremity of that lake. This journey alone would establish the fame of any ordinary man; but, with Livingstone, it was but a commencement. It was followed by a series of discoveries of the first geographical importance, achieved in the face of dangers and hardships which only the most undaunted courage and resolution could have overcome. Ascending the mountain range to the west of Lake Nyassa, he reached a very elevated plateau in the heart of the African continent. Here he found a cold moist climate, a country covered with forests, and a growth of mushrooms on which his people subsisted for several days. A few passages in his letters give a vivid idea of these

surprising features in Central African geography, which are as remarkable as they are unexpected. Sloppy dripping forests, with wild fruits and mushrooms, are not what our previous knowledge of Central Africa would lead us to anticipate. North of this wonderful table-land the great traveller descended to a lower level, in which lie the lakes supposed to hold the sources of great rivers—the fountains, he believes, of the Nile and the Congo. He reached them, with his party reduced to four of the Nassick boys, and himself worn to a shadow, by wet, hunger, and fatigue. He discovered a whole string of minor lakes, some of them of remarkable beauty, with cultivated islets, and villages embosomed in palm-trees on their shores. He visited the renowned Cazembe; he traversed a watery and much inundated region, and at he length reached Ujiji, on Lake Tanganyika.

Letters were received from him, dated at Lake Bangweolo on July 8th, 1868, and the last that have come to hand were dated Ujiji, May 30th, 1869. He announced that the work still before him was to connect the lakes he had discovered, with the Nile, that he intended to explore a lake to the westward of Tanganyika, in the Manyema country, and thence to complete his labours. But he was sorely in need of men and supplies; the Arab traders interested in the slave trade were anxious to thwart him, and no one would take charge of his letters. He mentioned having written thirty-four letters, which had all been lost. This is the last positive news from Dr. Livingstone. There was an Arab report, in November, 1870, that he was at the town of Manakoso with few followers, waiting for supplies, and unable to move; but the last certain intelligence will be three years old on the 30th of next May.

The question now is—Shall this great and noble-hearted man be left to his fate?

In January, 1870, the Treasury sanctioned a grant of 1000*l.* to send stores by natives from Zanzibar, through the Political Agent; but this method of affording relief failed, and neither letters from Livingstone, nor proofs that he ever received the stores, have reached the coast. Mr. Stanley, an American traveller, also attempted to penetrate into the interior, but he was stopped by disturbances at Unyanyembe. It has thus become clear that, if Livingstone is to be relieved, a properly equipped expedition, ably commanded, must be despatched from this country to do the work. Moreover, it is necessary that the equipment of such an expedition should be thoroughly effective, and that this object should be secured by liberal subscriptions.

The Lords of the Treasury have declined to grant any pecuniary aid to the expedition which is destined to bring succour to Dr. Livingstone, who, it must always be remembered, is Her Majesty's Consul for the interior of Africa. But he is also one of our greatest travellers. He is known, by all his countrymen, to be actuated by the noblest aims, his name has become a household word in this land, and no adverse decision from the Treasury will be allowed to check the necessary preparations, nor to retard them for a single day.

The known facts upon which the Council of our Society have had to base their decision in this matter were few, but they all pointed to one obvious course. According to the latest rumours, which are to some extent corroborated by the great traveller's expressed intentions, Dr. Livingstone is in the Manyema country, to the westward of Lake Tanganyika. He may be prostrated by sickness—enfeebled and disabled by those long marches over leagues and leagues of inundated country, and through forests saturated with damp. He may be detained by the impossibility of obtaining supplies and men, and unable to move from want of means to pay his way. In his last letters he anxiously and urgently applied for such aid, without which the traveller in Africa can make no progress. Dr. Barth was frequently exposed to long detentions from the same cause, and it is quite possible that Livingstone may be waiting for such help, in order to complete his work. We know that the Arab traders take every means to intercept his communications with the coast, so that the absence of letters need cause no special uneasiness. These Arabs are actuated by two motives. They desire to prevent any letter from coming to the coast from Livingstone, because it would disclose the fact that he has never received any of the supplies that were entrusted to them. At the same time they continue to spread rumours of his safety, in the hope that they may be entrusted with more stores. The attempt to send relief through them is, therefore, worse than a waste of money, for it is a direct obstacle to obtaining authentic news.

The only alternative is to despatch a relief expedition, led by Europeans; and, as soon as the Government method of sending supplies proved to be futile, and the failure of Mr. Stanley's attempt was known, the Council of our Society resolved to take more effectual steps. The fortunate accident that an excellent opportunity offers itself of reaching Zanzibar, in the first steamer that has ever made the direct voyage by the Suez Canal, is a sufficient reason for the rapidity with which it is necessary to prepare and despatch the expedition.

In forming their decision, the President and Council have had the advantage of experienced advice from General Rigby, the late, and from Mr. Churchill the present Political Agent at Zanzibar, as well as from Colonel Grant; and they have very carefully considered the question in all its bearings. Captain Burton also has expressed his cordial good wishes. The most anxious duty has been the choice of a Commander for the expedition. Volunteers poured in by scores; many merely wishing to join as subordinates in the glorious work, but some thirty submitted their qualifications for command. There have been, in all, nearly 200 applicants; and their claims required careful consideration.

The choice has fallen upon Lieutenant Llewellyn Dawson, of the Royal Navy, a scientific seaman. He possesses most of the qualifications that are needed to fill so difficult and trying a post, and the Council have perfect confidence in his ability and judgment. Those points in which he is at present deficient, he will soon acquire. He has not, for instance, had previous experience in African travelling; but this was inevitable,—Burton and Grant are the only men in England who now possess experience of that part of Africa; and Dawson, if he has it not now, will have it before many months are past. He has youth and health and strength, and that quiet but resolute determination which overcomes obstacles. He is a well trained surveyor, and will bring back work which can be thoroughly relied upon, and which will furnish accurate geographical material. Already he is not unknown to geographers, young as he is in years. In 1869 he distinguished himself in the difficult operation of the survey of the gorges and rapids of the Upper Yang-tsze-Kiang, and he has since been employed on the survey of the River Plate. Portions of his official report will be found in the 40th volume of our Transactions; and we may confidently anticipate that, in a future number, he will contribute a narrative which will challenge a vanward place among the communications to this Society. We feel confident that in Lieutenant Dawson the Society has secured a leader who will ably and efficiently perform the responsible and very difficult task that has been entrusted to him.

It is intended that he shall be accompanied by a second in command, and, at the request of the Council, the Foreign Office has made an application to the Admiralty that any naval officer who may be employed on this expedition, may be borne on the books of one of Her Majesty's ships, and be allowed time and full pay. Mr. W. Oswell Livingstone, the great Traveller's son, who, it will be remembered, was born twenty years ago in the neighbourhood of Lake N'gami, will also accompany the expedition. Filial affection,

and the spirit of enterprise which he has inherited, have prompted him to volunteer; while his medical studies at Glasgow have fitted him to be of real service, and have justified his appointment. General Rigby is of opinion that his presence, and the spectacle of a son thus facing toil and danger to bring succour to his father, are calculated to make a strong and beneficial impression upon the Arabs; and young Livingstone will certainly go forth with hearty good wishes from the Fellows of this Society.

There is some reason to hope that the services of Mr. New, a gentleman connected with the Mombas Mission, who has recently made a remarkable ascent of Mount Kilimandjaro, will be engaged as interpreter; and it is intended that, besides Europeans, the expedition shall consist of an armed native escort of picked men, besides porters; which will be prepared in advance by Dr. Kirk, at Zanzibar. The party will leave England early in February, in the *Abydos* steamer, chartered by Messrs. J. Wiseman and Co, who have generously undertaken to convey all stores free of charge, and if possible to secure free passages for the members of the expedition.

The objects of the expedition are, in the first place, to succour Dr. Livingstone, by penetrating to a place called Manakoso, where he was last heard of; which is believed to be on the banks of a great lake in the Manyema country, west of Lake Tanganyika. It will be for Lieutenant Dawson to select the best route, after consultation with Dr. Kirk at Zanzibar. The country originally traversed by Burton and Speke is said to be in a very disturbed state, and it may be found advisable to take a more northern line from Mombas; but this, of course, will depend upon circumstances. Having reached Manyema, and secured the grand object, the route to be taken on the return journey will depend very much upon the views entertained by Dr. Livingstone, and upon various other considerations. Intelligence has been received that Sir Samuel Baker, with all the Europeans of his party in good health, has reached Gondokoro. When he has once launched his steamer on the Albert Nyanza, a few days will bring him to its southern shore, within a short distance of the Tanganyika. It is possible that he may meet the relief expedition; and, at all events, in considering the position, the proceedings of Sir Samuel Baker, and the advantage of connecting his discoveries with those of Livingstone and Dawson, are elements which will be kept in mind. But, in drawing up instructions, much will be left to the discretion of the Commander of the Expedition, and he may confidently be trusted to act to the best of his judgment, as circumstances arise. His first duty is the relief of Dr. Livingstone, and the preservation of all the precious know-

ledge which that great Traveller has collected; for it must be remembered that as yet Livingstone has communicated nothing beyond the briefest allusions in his letters, and if he is lost, the results of his labours, and all his wonderful discoveries, will perish with him. It is this consideration which justifies the Council in devoting so large a sum from the funds of the Society. In performing the first great duty, and in restoring Livingstone to his family and country, Lieutenant Dawson will also explore a most interesting region which his scientific training will enable him to delineate with precision, and he will thus do good service to geography.

The expedition will be furnished with the needful funds through the subscriptions of the British public; and in such a cause there cannot be a doubt that those subscriptions will be amply sufficient, before the time comes for the expedition to start. At present, however, they fall short of what is required.* The Council of our Society has devoted to this noble object as large a sum as the state of the finances would justify. Friends of Livingstone, admirers of the heroic qualities displayed by the great Traveller, and lovers of geography and discovery, have come forward liberally. Handsome sums have been subscribed. Messrs. Frodsham have lent a pocket chronometer for the use of the Expedition. Others have shown a similar desire to give useful assistance: and the Council are confident that they will secure the hearty co-operation of the great body of the Fellows in furnishing forth the expedition, and in wishing God speed to our gallant friends, when they set forth to achieve one of the most glorious enterprises that has ever been promoted under the auspices of the Royal Geographical Society.

In reply to a question by Mr. T. Lee, the PRESIDENT read the following correspondence, which had taken place between the Government and the Society, relative to the Livingstone Relief Expedition:—

"SIR, "1, Savile Row, W., 3rd January, 1872.

"I have the honour, on behalf of the Council of the Royal Geographical Society, to lay before you the copy of a notification which they propose to issue to the public with a view of inviting subscriptions for the purpose of enabling the Society to send out an Expedition to search for and relieve the well-known Dr. Livingstone, who is believed to be detained in the interior of Africa, and to be prevented either by sickness or want of supplies from making his way to the coast; and I am at the same time empowered to express the hope of the Council that, as Dr. Livingstone is honoured with the commission of Consul from H.B.M. to the Chiefs of Central Africa, and in this capacity was considered to be entitled to relief at the public cost two years ago, H.M.'s Government may see fit on the present occasion to contribute to the expenses of the proposed Expedition a sum equal to that advanced from the funds of the Society.

* The sum already subscribed is 1700*l.*, but 5000*l.* are required.

"The Council, indeed, rely on the favourable consideration of H.M.'s Government of this request, with the more confidence that the necessity of sending the present Expedition has arisen mainly from the miscarriage of the former attempt to convey to Dr. Livingstone the supplies forwarded by the Foreign Office through Dr. Kirk, H.M.'s Acting Political Agent at Zanzibar, no intelligence having yet arrived that any portion of these supplies have reached the Doctor, while it is known that a large instalment of them was intercepted at Unyanyembe on their passage to Lake Tanganyika.

"Although Dr. Livingstone has been supported during his recent travels in Eastern Africa in a great measure by the funds of the Royal Geographical Society and the contributions of his private friends and admirers, yet it is felt that his great achievements have now become the property of the nation, and that the public will look accordingly to the Government of the country, for the due support of such measures as may be organized with their approval for his relief.

"I have the honour to be, Sir,
"Your most obedient servant,
"H. C. RAWLINSON,
"President of the Royal Geographical Society.

"*The Right Hon. R. Lowe*, M.P.,
"*Chancellor of the Exchequer.*"

"SIR, "Treasury Chambers, 16th January, 1872.

"I am commanded by the Lords Commissioners of Her Majesty's Treasury to acknowledge the receipt of your letter of the 3rd instant, written on behalf of the Council of the Royal Geographical Society, soliciting a grant from Government in aid of the Expedition which it is proposed to send out in search of Dr. Livingstone, and to inform you in reply, that my Lords, after full consideration, are of opinion that the direction in which the proposed search should be made is too doubtful to warrant public expenditure upon it. A new expedition is not the only means left through which Dr. Livingstone's safety may with reason be hoped for.

"I am, Sir, your obedient servant,
"WM. LAW.

"*Major-General Sir H. C. Rawlinson*, K.C.B.,
"*President of the Royal Geographical Society.*"

Mr. J. R. ANDREWS expressed his opinion that, after receiving such a reply from the Treasury, the Council ought to consider whether there was not some other course open to them besides sending the proposed Expedition.

The PRESIDENT said the Council had felt the gravity of the question, but had entirely failed to divine what possible alternative could be alluded to. The only meaning he could attach to it was that Dr. Livingstone might find his own way back, and consequently all the expense might be saved.

A FELLOW recommended that the Government should be asked what the alternative course alluded to was. They might have some useful suggestions to make.

Mr. THORPE suggested that all Fellows of the Society who were members of Parliament should endeavour to put all the pressure possible upon the Government, which was bound by duty and humanity to do something to rescue Dr. Livingstone, who was suffering so grievously in the cause of science.

Rev. HORACE WALLER asked whether or not the Admiralty was prepared to keep Lieutenant Dawson on full pay, and to allow his time to count during his absence on the Expedition.

The PRESIDENT said he could not give a complete answer to the questions that had been asked; but he knew enough of Government business to have a suspicion that such a letter as that which had been received from the Treasury did not necessarily commit the whole Government. The Foreign Office had always shown the greatest readiness and, indeed, anxiety to assist the Society in every attempt to relieve Dr. Livingstone. Only two years ago they granted 1000*l*., when Lord Clarendon was Foreign Secretary, for the purpose of sending supplies by native agents to Livingstone; and although their efforts had hitherto been ineffectual, that did not in any way militate against the honesty of their efforts, and the anxiety they had shown on his behalf. When the project of sending a relief Expedition, led by Englishmen, was first started, the Foreign Office was communicated with, and although, owing to the illness of the Secretary of State for Foreign Affairs, no official answer had yet been received, the Under Secretary had replied semi-officially to the effect that the Foreign Office would instruct Dr. Kirk to give every possible assistance to the Expedition. That showed that this Department took a very lively interest in the subject. There was also some reason for believing that the Admiralty was similarly disposed. Up to the present time no direct answer had been received to an application requesting that the time of the officers engaged in the Expedition might be allowed to count as active service, by transfering their names to the books of one of the ships on the Indian station. He understood that the Treasury answer was very similar to those which all departments of Her Majesty's Government were in the habit of receiving. The Society were not solitary victims of Mr. Lowe's views of economy, and it would therefore be a matter of regret if the Society should hold either the Foreign Office or the Admiralty responsible for the extreme economy of the Treasury.

Admiral COLLINSON said he did not believe the answer from the Admiralty had as yet been decided upon. His impression was that it would in a great measure depend upon what was said at that meeting. When Burton and Speke went on their Tanganyika journey their regimental pay was continued, and they received their time. The same thing was done with respect to Speke and Grant when they went on their subsequent exploration. He hoped the Society would express their strong opinion that a similar course should be pursued with regard to the officers engaged in the Livingstone Relief Expedition.

Mr. J. BALL (Foreign Sec. R.G.S.) trusted it would not go forth to the public that there was any doubt whatever as to the propriety and importance of sending out the Expedition without one day's unnecessary delay. It was notorious that there was no department of the Government which did not daily receive rebuffs from the Treasury, such as that which the Society had received. It was well understood in all official circles that the Treasury was a department of control, and the clerks exercised their utmost ingenuity in finding every possible reason for refusing every application for money, and unless some higher power stepped in, whenever it was possible to find an excuse for not giving money, no money was given. However, it was a matter of perfect indifference to the people of this country and to the Royal Geographical Society, whether the Treasury did or did not give 500*l*. That sum was perfectly trifling as compared with the amount of feeling which had been awakened.

Mr. DALLAS said the Treasury had not only given the Society a cold refusal, but had attempted to put them in the wrong with regard to the course they were pursuing, while carefully abstaining from suggesting a better.

The PRESIDENT added that it never occurred to the Council to refer to the Treasury on a question of geography. They considered that they were themselves the best tribunal for judging what were the best means to be adopted for the relief of Dr. Livingstone; and if they had deliberately come to the con-

clusion that an expedition was the best means, that opinion was far more deserving of consideration than the empirical recommendation conveyed in the concluding sentence of the Treasury letter.

Dr. PURCELL hoped that any approach to semi-political questions would be avoided by the Society, and that their attention would be confined to purely scientific geographical business. Whether the Treasury were parsimonious or liberal, or whether they displayed their ignorance or not, was not for them as geographers to consider; but they must, under any circumstances, do their best to relieve a traveller whom they so dearly loved.

Mr. THOMAS LEE asked if Dr. Kirk had been authorised by the Foreign Office to lay out any money on behalf of the Expedition.

The PRESIDENT said there was a considerable balance of the Foreign Office Grant of 1870, for the relief of Livingstone still unexpended. Out of the 1000*l*., 400*l*. or 500*l*. only had been spent; and the balance remained in the hands of Dr. Kirk, over which he had full control, and which he would lay out in any way he supposed most conducive to the relief and assistance of Dr. Livingstone; but the Royal Geographical Society had no authority to give him instructions on the subject, and the money in his hands was not available for Lieutenant Dawson's expenses. They had telegraphed to Dr. Kirk, directing him to spend 500*l*. on their own account in preparations for the Expedition, in obtaining porters, and guards, and in purchasing supplies. It so happened also that at this particular time, by a mere accident, a most favourable opportunity offered for penetrating into the interior. The last letters from Dr. Kirk stated that a mission from the King of Uganda had arrived there with presents for the Sultan, and it was most probable that the ambassador and suite would be still there when the Expedition was about to start. It was therefore probable that Lieutenant Dawson would be able to avail himself of the escort of the Uganda party as far as Kazeh, from which point the routes of the two parties would diverge. The subscriptions received up to the present time amounted to about 1700*l*., and a meeting was being held that day in Glasgow, which, it was hoped, would realise from 500*l*. to 1000*l*. more. Meetings were also to be held in Edinburgh and other large towns, and a deputation from the Council was about to wait upon the Lord Mayor of London to arrange with him for holding a great public meeting of the citizens of London, and soliciting their assistance. The prospects of the Expedition were very promising, and it really was almost a matter of indifference whether the Treasury gave a grant or not.

Mr. TRELAWNY SAUNDERS thought it unfortunate that the Treasury had failed to perceive the great national interest appertaining to Livingstone, and, apart from Livingstone, to many other interests connected with the continent of Africa. If there was any part of the world upon which Englishmen had of late bestowed their care, it was Africa, and yet of all the surface of the earth it remained among the least known. The Expedition which was about to set out under Lieutenant Dawson, was one the end of which no one could foresee, for it had sometimes devolved upon searching expeditions to accomplish objects not contemplated by the lost party.

Lieutenant DAWSON was then introduced by the President, and said:—"Gentlemen, I need not say that I feel highly honoured and gratified at finding myself in the proud position of leader of the Expedition about to search for Dr. Livingstone. Before offering myself as a candidate for this post, I had carefully weighed and considered all the difficulties attendant on an undertaking of this description; and had I not felt myself capable of doing battle with those difficulties, I should have refrained from laying my qualifications before the Council. It was not possible for anyone, before starting on an expedition of this sort, to do anything more than state his good intentions; his deeds must come afterwards. I am well aware that I have the eyes of

the whole British public on me—all the more stimulus to endeavour to clear up the mystery attending Livingstone's fate, or to find out his whereabouts. Backed as I shall be by well-chosen companions, it will be my utmost endeavour to carry out the instructions given to me by the Council of the Society; and no greater reward can I have than that of doing so to their satisfaction. After what has been said to-night, it is useless for me to enter into the geographical part of the discussion; but I take this opportunity of thanking those travellers and residents in Africa who have so kindly given me many hints and suggestions as to the organisation and equipment of the Expedition, by which means that part of the undertaking, at any rate, has been much lightened. I also have to thank the Hydrographer to the Admiralty for his kind recommendation, owing to which I feel it to be mainly due that I find myself in the responsible position of leader of this Expedition, which I hope, with God's help, will prove successful."

The following was then read:—

Letter to Dr. KIRK *on an Ascent of Mount Kilima Njaro.* By the Rev. CHARLES NEW.

"DEAR SIR, "Mombasa, 2nd November, 1871.

"You will, perhaps, be glad to hear that I have returned in safety from my trip to Chagga. I trust my last letter, in acknowledgment of your kind favour and the Sultan's passport, reached you. Now, upon my safe return, I wish to express once more my grateful sense of the efficient aid you afforded me. If you would express the same thing in my behalf to the Sultan I should feel greatly obliged.

"You will, perhaps, have heard before this that I made a successful attempt to ascend Mount Kilima Njaro; that is, that I reached the limit of perpetual snow.

"At your suggestion, through Mr. Wakefield, I made a very small collection of the plants on the heights of the mountain; but I am sorry to say that most of these got spoiled. I had nothing better to dry them with than old 'Guardians,' and, as I was afraid, I made but so very indifferent use of these, I found upon reaching my journey's end, that most of the specimens had rotted. I am almost ashamed to send you what remains; but I do so, assuring you that I shall be well contented if they do not excite your contempt. I prefer sending them to you to throwing them away. What there are, are chiefly from the last limit of vegetation. They are in better condition than the rest, and are almost all that grow in the region in which they were found. The various regions passed through on my way up the mountain's side succeed each other as follows:—

"1. The region of the banana, plantain, maize, &c. This is the inhabited district, or Chagga Proper. The thermometer ranges between a maximum of 85° Fahr., and a minimum of 59° Fahr. Blackberries are abundant. The hills which are not cultivated are covered with a beautiful thick, close, turf, exceedingly rich in clover.

"2. Beyond this is a belt of thick jungle; it may have been cultivated in the past.

"3. Above this is a vast forest of gigantic trees, with a dense undergrowth of great variety, all thickly covered with moss, which gives to the forest the appearance of great antiquity. Here I met with such old friends as the dock and common stinging-nettle. Vines abound in great variety. On the higher

verge of this forest the thermometer descended at night to 33° Fahr. In the morning a thick hoar-frost covered the leaves.

"4. Higher still is a region of verdant hills, affording good pasturage for cattle. Clover plentiful.

"5. Beyond this all is heath, which dwindles away, till you come to

"6. The region of bare rocks, and sandy, wind-swept declivities, as clean and as smooth as a sea-beach; then you reach

"7. The everlasting snows, which thickly cover a magnificent dome, as smooth in outline as the edge of the moon.

"Hesitating to trouble you further, I beg to remain,

"Yours sincerely,

"CHARLES NEW.

"*To J. Kirk, Esq.*, M.D.,
"*H.B.M.'s Vice-Consul, Zanzibar.*"

The following letters and papers, communicated by the Rev. ROBERT BUSHELL, Secretary to the United Methodist Free Church Missionary Society, contain further details:—

"Ribe Mission Station, Cheetham Hill,
October 26, 1871.

"REV. AND DEAR SIR,

"You will be glad to learn, doubtless, from my own pen that I have returned to Ribe in health and safety from my somewhat difficult and perilous journeys to the countries of Teita, Chagga, &c.

"I left Ribe on the 13th July, calling upon the Rev. J. Rebmann, of the Church Missionary Society, at Rabai, who has made three journeys to Chagga, one as far back as 1848. This gentleman received me very kindly, gave me what information he could, and lent me several instruments which would be useful to me on my journey.

"Leaving Rabai, I took my course through Duruma, down Ndunguni, through the wilderness to Kadiaro, or Kisigau. On the first day I slept at the stream Muache, in the Duruma country, and the next day reached Ndunguni. On the 18th July I made Taru, next day (19th) camping north-west of Kilibassi; on the 20th, *viâ* Kithima hills, where we found water, we made the foot of Rukinga, and camped; next day (21st) pitched our tent within the points of the southern amphitheatre of Kisigau.

"Kisigau is the first hendari or food-supplying mart at which caravans arrive on their way to the interior: here we laid in provisions. The people are physically, mentally, and morally a most degraded race, but are civil to travellers. From Malate, which we reached on the 26th, we turned our faces towards the Lake Jipi. Our guide lost his way on this day, taking a course far too much towards the south, and after tearing up and down innumerable ditches, washed out by the water in its yearly course down the sides of the hills (Muarimba), he brought us up on the western side of the hills, in the middle of a dense wood, through which we had to hew our way with axes, thus making but three hours' march during the whole day.

"The 29th July was a trying day; I could scarcely move the men. Towards noon they complained bitterly of thirst, yet we had no water. As they would not listen to precept, I tried example, and pushed on alone. Soon after noon silvery patches between the trees were descried, and I shouted to the men, who were trying to keep up with me, 'Here we are in sight of Jipi.' But it took me two hours' hard walking before I reached the water's edge. Mungoma reached the water with me. We thanked God and drank. We soon heard that two of the men had dropped on the road from exhaustion. Water was sent to these, and they came down at night.

"On the 30th July we made our way to Taveta, which is a beautiful spot,

and the soil very fertile. The people are half Taveta and half Wakuavi, and speak both languages. I was received in Taveta with great civility and respect.

"On Sunday, 6th, about noon, we reached Moche. I was not allowed to enter the place at once, because I refused to have anything to do with certain superstitious ceremonies, which are considered by the people as charms against the evil eyes and feet of strangers. But when these matters were adjusted, I was led to a camping-place midway between the two residences of the *Mange*, or king.

"After some time the Mange made his appearance, and sat down before the tent. I approached him, extended my hand, and said, 'Yambo, Mange.' He returned my salutation very heartily, and we were at home together at once. I remained at Moche a month. I saw the Mange almost every day, and he expressed his desire to learn to read and write. He learnt the numerals in two days, and would have me fill a sheet with the leading numbers up to 100,000, so that he might study them when I left him. Mandara has a *wonderful* taste for civilization. I think much might be done here, though there are reasons against the prospect of immediate action.

"Up to the time of my reaching Moche I had not seen its summits. I had walked round a portion of its base: indeed, in entering Moche on this very day, Sunday, August 6th, I had climbed between 2000 and 3000 feet up the mountain side, yet its top remained invisible. Towards the close of the day, however, the sky became clear, when Tofiki called me, and pointing towards the north across the plantations, asked me if that was not the Kilima Njaro, exclaiming, 'What a height, and how white!' which called forth from me the almost unconscious expression, 'As white as snow.' The words almost surprised myself, and I said, 'It *is* snow! Yes, this is Africa, and there is snow, snow, veritable snow!'

"Arrangements were made for ascending the mountain, but my first attempt was a failure, being driven back by the rain and fogs. A second attempt was made, and the weather being very fine, we made splendid progress. Next morning the clouds lay far beneath our feet, but at noon we were prevented from proceeding farther by the mists; we, however, made large fires to keep ourselves from freezing through the night. The next morning (the third day) we again started, but in half an hour after starting the men complained of benumbed feet and hands. In an hour we came to a stand; the Chaggas said they dared not go any farther. I left them, going forward with only Tofiki for a companion. Tofiki did very well for the first hour and half, when he sank, scarcely being able to speak. He bid me go on—that he would wait there for *me*, and *die* if I did not return to him. I went on, reached the snow; I found it lying on ledges of rock in masses, like large sleeping sheep. I got Tofiki up to the point; the snow was frozen like rock. I broke off several large pieces and descended with them to the company below, at the sight of which they were amazed, especially when it melted in their mouths. Thus, despite all the wonderful things that have been said and believed, we know, from personal experience, that the top of Kilima Njaro is covered with snow! Yes, snow in Africa.

"I remained at Moche until August 31st, when I bid Mandara, the mange, farewell, having prevailed upon him to send me back to Taveta, *viâ* Marango, Mamba, Massi, &c.

"Leaving Moche the next day, we reached Marango, where we were received by Kimbo, the mange, with much deference. He gave us a cow, and accepted our small present in return.

"Left Marango for Mamba on the following day, September 2. Malavi, the mange, received me like an African gentleman. He likewise gave us a cow, and very graciously received our small present also. Here we spent the Sunday and held religious service.

"Passing through Msai, Banana, &c., on the 6th, we reached Chala. This is a beautiful lake of small extent, quite unknown in geography, the waters of which are soft and sweet.

"Next day, September 7th, we reached Taveta about noon. Remained at Taveta till the 19th, when we decided to return to the station *viâ* Bara and Ndara, for the sake of completing my investigations regarding the Teitas.

"On the 20th we camped before Bara, but on the 21st the guide lost us once more in a wood, from which we had to cut our way out with daggers and axes.

"On the 22nd we camped at Gnambua. Maina, the chief of the place, made his appearance very soon after our arrival and made great pretensions, but he is a shabby fellow.

"On the 26th left Bara for Ndara. Some of the Ndaras treated me with great attention. The grey beard of the place came down to pay his respects to me and presented me with a small goat.

"All the Teitas are in a most wretched condition in every respect, but appear quite contented with their lot.

"Left Ndara on the night of the 29th for a three days' journey to Silaloni. We chose going by night to avoid the heat of the day. It was a heavy journey, and reached that place more dead than alive. After a few days' rest we marched, on October 3rd, to a place called Dindini. Here I was prevailed upon to remain until the 9th. People came to see me from all parts and treated me with the greatest kindness. Here I preached the Gospel to scores every day.

"I reached Ribe on the 10th October, soon after noon. The porters became very excited. Their wives rushed out to meet them, relieved them of their loads, and shrieked their kigeljeles with all their might. The mission people were overjoyed at again seeing me; tears started to the eyes of some as they told me what stories they had heard of my death. Bueya Dabassa could express himself in no other way than by hugging me in his arms. I found Mr. and Mrs. Wakefield and child pretty well. They kindly invited me to dine with them, which I was glad to do.

"I returned to the station on the 12th; since that time I have been busy squaring up at Ribe.

"*To the Secretary of the United Methodist Free Churches.*"

"CHARLES NEW.

Copy of Letter of Rev. CHARLES NEW.

"Ribe Station, Cheetham Hill, East Africa,
"26th October, 1871.

"I WAS very anxious to visit Chagga and to find a lake, of which I had heard strange things, and which I had been fortunate enough to see from the heights of Kilima Njaro. It was said to be a lake enclosed within a circular hill-ridge, the lake lying so far down, and the hill being so precipitous, that not only animals could not reach the water, but that no human being had yet been able to descend to its edge, or to draw the water from below.

"It was said to be the abode of strange beings who lived below the water in caves, and it was asserted that the lowing of oxen, the crowing of cocks, the pounding and the grinding of corn could be heard by any one standing near the lake. Moreover it is a *fact*, that the people of Taveta make annual sacrifices at the lake, and have resorted to it for the same purpose on other occasions—altogether I was anxious to search it out.

"On the 6th September, 1871, we reached Chala. As we rose over the

eastern heel of Kilima Njaro, we obtained a good view of it, and as we continued our way downhill, we were favoured now and then with a peep at the object of our search. From the break in the western corner of the ridge, I fancied I was going to walk to the water's edge at once; but what was my surprise to find, on making this point, an abrupt fall of some 150 feet. The ridge rose on my right to perhaps 300 feet, then falling considerably towards the south, it continued its course towards the east, north, and west, till it reached the spot upon which I stood, and nowhere falling lower than it did at this place. It forms a complete circle on the inside, dropping abruptly into the water; but on the outside sliding down first steeply, and then gradually to the level of the plain.

"The water lay below as blue as the sea. It is a beautiful sheet of water, though not large; perhaps not being more than two miles in its furthest reach. After a little time, we found a path by which with some difficulty we found our way down to the bottom. It looked like the crater of an extinct volcano. The whiteness of the stones at the bottom suggested an incrustation of salt or some other mineral. I expected to find the water salt, so as to be undrinkable, but I drank, when lo! I never tasted water sweeter or more palatable. It was as soft as rain water, but without its taste. Chala is, I believe, altogether unknown to geography."

The PRESIDENT said when Messrs. Rebmann and Krapf first spoke of a snow-capped mountain in Equatorial Africa, the intelligence was received with almost entire incredulity. By degrees, however, it dawned upon geographers that such a thing might be possible. More recently Von der Decken, the Hanoverian traveller, ascended the mountain to a certain height, and satisfied himself that the summit really was covered with snow, but he did not actually reach the snow. To Mr. New belonged the honour of being the first to reach the snow-line, and he showed his merit as an observer by his description of the different zones of vegetation in ascending the mountain.

Mr. J. BALL said the arrival of the plants collected by Mr. New was awaited with the utmost interest, for it is probable they would throw light on the Geographical Distribution of Plants. The characteristic of the higher mountains of Northern Africa was their sterility and the poverty of their flora. This was illustrated both in Abyssinia and Morocco. No true Alpine plants were found in the Great Atlas, and none in Abyssinia. In the higher region of the Atlas the vegetation consisted mainly of dwarf stunted shrubs. The common gooseberry only attained a height of 1½ inch, and there was a species of cherry that rose no more than 3 inches above the soil. It was very possible that the region just below the highest on Kilima Njaro might prove extremely interesting, because the climate was entirely different from that of Abyssinia, so far as was known.

On Northern Borneo. By Lieutenant C. DE CRESPIGNY, R.N., F.R.G.S.

Sarawak, September, 1871.

I HAVE again been wandering in the northern part of Borneo, and the following remarks on portions of it may perhaps prove interesting. I was on this last occasion principally among the Muruts of the River Padass, where I went last year to hunt mias (ourang-outang), and as very little has been yet said about this river and its people, I venture to hope my notes will be acceptable.

The Padass has its source in Kinibalu, and runs through a great plain on the eastern side of the range of hills from which flow the Menggatal, Inanam, Sambulan, Putatan, Kinarut, Kawang, Pangalat, Benoni, Kimanis, and Membakut rivers; and it may be here mentioned that the River Papar, between Pangalat and Benoni, also has its source in Kinibalu, and running at first on the eastern side of that range, finds its way to the sea through a gorge or break in the chain. The Padass there, as it appears, runs south-west from its source, having on its right the Papar, and on its left the Banjermassin, and afterwards between it and that river, the Trusan, the Limbang, the Tutong, and the Rejang, and then again between it and Trusan the mountain stream Palmanlawas. I was not aware, until I arrived in this part of Borneo, that the Rejang extended so far, but at Government House I met a Rejang Dyak chief named Jeetee, who informed me that some years ago he had ascended one branch of the Rejang, until he got past Brunei, and among the Muruts. Supposing Jeetee's statement correct, and I see no reason for doubting it, I should be disposed to call this branch the main river, from the general direction of all the streams on the north-west coast.

The Padass then, soon after leaving its source, courses through a plain, the general features of which are relieved by low hills and undulating ground. The country is called Tabuhan, and the people Aggis, whom I take to be Dusuns, but I met none of them. They are said to be very fair, and both sexes to have long hair, that of the women reaching to the ground. A short time before I left Labuan to go up the Padass, one Orang Kaya Saffei of Kinarut informed me that a few months previously some people from the eastward visited his river. They were very fair, and had long hair. They had their own language, which the people of Kinarut could not understand, but they could speak Looloo. They brought with them dollars and tobacco, which they exchanged for salt and dry fish. They were accompanied by their wives and children. I suspect that these people were Aggis, and that they came either from the Upper Padass, Banjar, the Great Lake, or Kinibatangan; most probably as their wives and children were with them, from Padass, but also possibly, as they carried with them about 100 silver dollars, from Kinibatangan.

To seaward of the Aggis people live the Paluans. Their proper country is on the banks of a narrow river running parallel with and inland of the Padass, debouching into the great Brunei Bay; but they have gone past the sources of their own river, and certain communities of them have established themselves between the

Aggis and the Muruts. However, the Paluans are no other than Muruts, speaking the same language, but with a different accent. To seaward of the Paluans are the Upper Muruts, who occupy the banks of the river until it winds round Mount Jumma. The mountain is between 4000 and 5000 feet high, and is of a very precipitous sandstone formation. The river, at its base, forms a very long and dangerous rapid, so much so that the Upper and Lower Muruts, when they visit each other, prefer to leave their boats above or below the rapid and go over the mountain to meet their friends. Between the Muruts of Padass and the Paluan tribe is a perpetual feud. There was also a feud between the Upper and Lower Muruts at the time of my visit, and communications could only be kept up by means of men who had relatives on each side of Mount Jumma.

The Paluans appear to be divided into two sects: those who live in houses and till the soil, and those who lead a wandering life in the forest, following up the fruit-trees as each district brings its particular produce into maturity, like the mias, or like the wandering Pakattans of the district from which I now write (Muka in Sarawak).

The Upper Muruts speak the same language as the lower ones, with a different accent.

To seaward of Mount Jumma are the Lower Muruts, among whom I lived for four or five months. They are a vile race, being thieves and cheats, lazy, and too fond of drink, and extremely dirty, most of them being covered with vermin and ringworm. They live on the most charming part of the river, where it flows, after leaving Mount Jumma, between ranges of hills of about 1000 feet high, wooded, of course, from base to summit, having here and there little islands and pebble-banks, on which I have passed many pleasant moonlight nights, the mist hanging over the river and half obscuring the scenery, the dashing rippling noise of the water broken by the cries of the Argus pheasant and wonwon, a Murut sleeping on each side of me, a smouldering fire at our feet, the blue smoke from which contended with that from my briar-root. Notwithstanding their vices, I grew to like them to a certain extent, on account of the extreme solicitude which they always showed about my health and safety.

The Muruts are a dark race, as compared with the other inland inhabitants of Northern Borneo, and they have some customs peculiar to themselves. Those above Mount Jumma live in long houses like those of the Dyaks and of the Dusuns, whom I formerly visited in the more extreme north. The Muruts below Mount

Jumma live in small houses, generally too small to be comfortable. It was among these people, and in the middle of their beautiful country, that I spent a few very pleasant months, and I very much regret that want of funds once more prevented me from continuing the exploration of this most interesting country, Northern Borneo. These Muruts are very expert in preparing the upas poison, upon the effects of which many conflicting statements have been made, doubts having been expressed as to its power of killing a man or large animal. Now, I knew a man named Basilow, a Padass Murut, who was sumpited by a Paluan. He received two wounds, one in the calf of the leg, the other in the shoulder. The flesh turned green, not only near the wound, but on the breast on the opposite side; the man was much convulsed, the jaws became rigid, and he died in two hours in a state of coma. (A fearful act of vengeance, which I will presently describe, was made by his tribe.) One of my Muruts sumpited an adult female mias, and she, after having rapidly formed a nest to die in, according to the custom of those animals, continued to groan for about half an hour, when she expired. I must here say that many other mias were sumpited by my Muruts, although contrary to my wish, and got away—whether to die in the forest or to get the better of their wound, I know not. The fact is, that some men have a reputation for their upas, whether it is that they are able to mix the poison with greater skill than others, or whether they obtain it from some particular tree unknown to other people—of a more venomous species, or at a certain stage of its growth, or at a certain season of the year—I could not find out. They, however, had the reputation of having more powerful incantations than others. One thing is certain, that, however potent the poison may be when first mixed, it loses strength after the lapse of a month or six weeks; and it is a mistake to suppose, with some people, that its powers are renewed by the application of lime-juice. It is not generally known that two vegetable juices are used. The first is the juice taken from the bark of the upas-tree, and it will be news to many to hear that there are many varieties of this tree in Borneo. So far as I could observe and learn, they all agree in having pubescent leaves, and fruit of the appearance and size of a large bush-sloe, so common in the hedges at home, the taste, however, being different, the purple skin slightly acrid, the pulp covering the single stone being simply insipid and without taste. The bark of these trees is deeply furrowed, and the tree itself is not excelled in stature by any other of the forest giants, and full-grown will measure 12 feet in girth 5 feet above the earth. The bark is incised, and a small quantity of the liquor exudes—nor, so far as I

could learn and observe, was this the sap of the tree, but an exudation from the bark itself. This juice becomes concrete in the course of an hour or two, and is then rather brittle, and both in appearance and consistency resembles Spanish liquorice, except that it is not quite so dark. I had the curiosity to eat some of it. The taste was intensely bitter, as if it had been concentrated quinine, and I asked the Muruts if they ever used it as medicine for the fever. They replied in the negative. Since I have been in Sarawak, however, I hear that the Dyaks use the sumpit poison as a febrifuge, but whether it is the juice of the upas-tree, or that called "bima," which I am about to describe, I am not sure, as my informant could not tell me: I think it must have been the former.

I learned from the Muruts that the upas is the true poison, but that it is of little use unless intensified by an admixture of the bima. This is an extract procured by maceration from the roots of of several lowly shrubs, of which I only saw two in the forest, the appearance of one only of which I now remember. It was not unlike the native palm, but was not thorny. It had small white flowers, and a bunch or club of red berries. The root, after being macerated to a pulp, was dried in the sun, when it assumed the consistence of the dried upas-juice, but was of a raw sienna colour. I ate a piece of this, and found it to be like the other, of most intense bitterness, with no difference in the flavour. They say the bima is not in itself at all poisonous, but without it the upas would be but of little use.

When the poison is required for use, each kind is rubbed down separately with warm water, and mixed in proportion of about two upas to one bima, with much muttering of spells—the heads of the darts then dipped in, and the poison compressed around them. The heads of the sumpits are so made that if the entire head fails to stick in the wound, at least part of it must do so.

The Muruts have curious customs as to the eating of pork. They will all eat the flesh of pigs killed in the chase, or that of any pig which may be found floating down the river, partly consumed perhaps by an alligator; but of pigs home-fed they will not partake,—except only of those which have been bred under their own roof. Any one knowing the filthy manner in which these pigs are fed will appreciate the desire on the part of the Muruts to draw a line as regards the consumption of pork. I could not even persuade them to eat a little of my delicious tin-bacon.

The Muruts are head-takers, but do not preserve the heads as do the Dyaks; they keep the skulls, or will even divide the skull of an

enemy into several shares. They take also the finger-nails of their enemies, which they display as trophies outside their houses. In the case above alluded to, where Basilow was killed, the Muruts seized a poor old Paluan woman who had long lived among them, bound her and set her on a bamboo grating over the open grave of the murdered man. Then the brother of the deceased stabbed her, and any one of the bystanders who wished did the same, her blood falling on the corpse. After this her skull was divided among the chiefs; and I saw the principal chief decorate the plot of ground before his house with a part of the skull, having the long hair attached, and the ten finger-nails, five on a pole, as supporters, the pole being decorated with ribbands of the skin of the banana plant.

On the Kalias River, near Padass, live a tribe of people called Köijoes. They differ much in their habits from the neighbouring tribes, and more especially in their food, for where, as among the Muruts and Dusuns, a certain line is drawn as to the alimentary pabulum, nothing comes amiss to a Köijoe—snakes, worms, and beetles are eaten by them as a matter of course.

Much has been said from time to time of the Pemans, and how they live in trees, and do not intermarry, but have all things in common: the fact is that they do not live in houses, because they have comfortable caves at the top of a limestone range of mountains up the small river Lawas, between Padass and Brunei. They do not cultivate the soil, but they exchange the edible birds'-nests which they find in their district with the Muruts of the country below them, for rice, salt, and sago. A small community of them lived on the Padass, and had built a village and planted pinang and other trees, and were at least as civilised as my Muruts.

Towards the sea on the alluvial plain, after leaving the mountains, dwell the Bisayas, a very handsome, fair-skinned and vivacious people. They are Islam on the Padass and Kalias, although not so on the Limbang: concerning which river I sent a paper to the Society many years ago. These Bisayas live in comfortable houses, grow padi, and cultivate the sago-tree, rear cattle and buffaloes in large quantities, live well, and are for the most part free from disease. They wear their hair quite long, contrary to the practice of their neighbours, the Malays and Muruts. This would perhaps give them an effeminate appearance, were it not for their well-knit muscular forms; but, as it is, the long hair seems to be not out of place.

The only other "inhabitants" of the Padass district are the mias (ourang-outangs), and these dwell on the right bank of the river

only, none ever being found on the left. This remark applies also to the won-won (Hylobates), another ape. They range the forests extending along the mountain ranges between the Padass and the Papar. They live in families—the male, female, and a young one. On one occasion I found a family in which were two young ones, one of them much larger than the other, and I took this as a proof that the family tie had existed for at least two seasons. They built commodious nests in the trees which form their feeding-ground, and so far as I could observe the nests, which are well lined with dry leaves, are only occupied by the female and young, the male passing the night in the fork of the same or another tree in the vicinity. The nests are very numerous all over the forest, for they are not occupied above a few nights, the mias leading a roving life. They feed principally on the wild durian, and the fruit of the gamboge-tree, which is of the same order as the mangostin. They have not the art of constructing a cover to their nests, but in captivity will eagerly avail themselves on a cold day of anything given to them, as a cloak. I have seen young ones just taken from their mothers spread a sheet of newspaper over their shoulders, and hug it together across their breast, resisting any effort to deprive them again of it. The mias of Padass are very large, more so I think than the generality of those I met with in the Maludu district years ago. I shot the largest one of which we have any authentic record. He measured 8 feet 10 inches in stretch from finger end to finger end; breadth of face across the callosities 13 inches; height 4 feet 7 inches. By the unworn appearance of his teeth and nails he seemed to be just in his prime, if indeed he had altogether done growing; for, as Wallace's largest measured only 7 feet 9 inches in the stretch, and 13½ inches across the face, I am inclined to think that my specimen, being probably younger than Wallace's, would have developed his callosities still further with age. I was surprised, upon dissecting this huge beast, to observe how very small were his organs of generation, not larger in all their parts than those of the human subject of tender years. I sent the skin and skeleton of this mias to Mr. Higgins, of Bloomsbury Street.

Much has been said about the link connecting the apes with the genus homo. I have, during all the years I have lived in Borneo, made anxious enquiries as to any variety of man, or mias, which might be regarded as a link, but without arriving at anything satisfactory. The story of the men whose backbones are prolonged into a short tail I regard now as a fable. I have, however, sometimes seen a native face unmistakeably and ludicrously similar

to that of the mias, and have very often observed among Muruts and Dyaks an extraordinary length of arm, the stretch being in these instances longer by several inches than the height of the individual. It must be evident that were men to be found possessed of a caudal appendage, it would not connect them at all with the mias, which has no tail. On the other side, to meet with men whose arms are out of proportion in regard to length, may be regarded as a step towards the desideratum.

I have never met with mias whose intelligence has been fostered and developed by man; but it may be interesting to mention in this place that a Murut informed me he had formerly had an adult male mias, living with his family, who followed him to the fields or to the forest, and who would help to bring in firewood to the house. I have also heard of a mias who was taught to bring fire to his master when desired to do so. In the Life of Apollonius I find that that sage in his travels visited a country where pepper was cultivated by apes. This would be either Borneo or Sumatra, the mias being found in both countries, and pepper having been formerly as extensively cultivated in Borneo as in Sumatra. As the writer of this Life, however, states that in the same country he went to the top of an exceedingly high mountain to confer with some sages who dwelt there, I must claim the honour of this visit for my adopted country, Kinibalu being so much higher than any mountain in Sumatra.

I send a rough plan of Padass and the neighbouring rivers,* also some vocabularies of North Bornean languages.

Dr. BRANDIS said in British Burma there were several species of *Antiaris*, and the inhabitants of the forests used the juice which exuded from the bark to poison their arrows with, and he had frequently witnessed its effect upon game. Some of the trees attained a height of 260 feet, with a girth of 30 feet. They had often beautiful straight stems, with large, shining, dark-green leaves.

* This sketch-map is deposited in the Society's collection.—ED.

VOCABULARIES OF NORTH BORNEAN LANGUAGES.

English.	Malay.	Brunei Low Dialect.	Bisaya.	Murut Padass.	Murut Trusan.	Dali Dusum, near Limbang.
Ant.	Samut.	Samut.	Sodom.	Sodom.	Liparus.	Sodom.
Ashes.	Abu.	Abu.	Abu.	Kau.	Abu.	
Bad.	Jahat.	Jahat.	Jahat.	Maraht.	Maraht.	
Banana.	Pizang.	Pizang.	Pizang.	Putih.	Baun.	Puntih.
Belly.	Prut.	Prut.	Tinai.	Tinai.	Batak.	Tian.
Bird.	Burong.	Burong.	Mamanok.	Lusuit.	Lusuit.	Wahu.
Black.	Itam.	Itam.	Maitam.	Maitam.	Bata.	Itom.
Blood.	Darah.	Darah.	Rah.	Dadaha.	Dadaha.	Lah.
Blue.	Bira.	Biru.	Matámo.	Matumo.	Matumo.	
Boat.	Sampan.	Prau.	Bidok.	Badao.	Alud.	Padass.
Body.	Badan.	Tulboh.	Inam.	Inan.	Inan.	Inan.
Bone.	Zulang.	Tulang.	Tulang.	Tulang.	Tulang.	
Bow.	Panah.	Paneh.	Panah.			
Box.	Piti.	Pati.	Pati.	Pati.	Pati.	Riti.
Butterfly.	Kupukupu.	Kulimbambang.	Kuliambang.	Kuliambang.	Kuliambang.	Kuliambang.
Cat.	Kuching.	Kuching.	Kuching.	Using.	Using.	Using.
Child.	Anak.	Anak.	Anak.	Anak.	Anak.	Anak biok.
Chopper.	Parang.	Pamarang.	Ganjow.	Dasigul.	Karit.	Daugal.
Cocoanut.	Kalapa.	Piasan.	Piasan.	Piasan.	Bua butan.	Bua butan.
Cord.	Sejok.	Sejok.	Sagid.	Marima.	Marádam.	Sagid.
Come.	Mari.	Mari.	Mari.	Dibok.	Zungi.	Liti siti.
Day.	Ari.	Ari.	Tungadan.	Samilan.	Sang-chow (au).	Adan.
Deer.	Rusa.	Payan.	Tambang.	Tambang.	Payo.	Tambang.
Dog.	Aujing.	Kuyuk.	Aso.	Uku.	Uku.	Aso.
Door.	Pintu.	Pintu.	Panurabun.	Panurabun.	Panurabun.	Paluang.
Ear.	Talinga.	Talinga.	Talingo.	Talingo.	Lalik.	Talingo.
Egg.	Taber.	Taber.	Ampuni.	Ampuni.	Taloh.	Ampuni.
Eye.	Mata.	Mata.	Mato.	Mato.	Mato.	Mato.

VOCABULARIES OF NORTH BORNEAN LANGUAGES—*continued.*

English.	Malay.	Brunei Low Dialect.	Bisaya.	Murut Padass.	Murut Trusan.	Dali Dusum, near Limbang.
Face.	Muka.	Muka.	Muka.	Muka.	Muka.	
Father.	Bapa.	Bapa.	Ama.	Ama.	Ama.	Bapa.
Feather.	Bulu.	Bulu.	Bulu.	Bulu.	Bulu.	Bulu.
Finger.	Jari.	Jari.	Kariam.	Kalendo.	Tichu.	
Fire.	Api.	Api.	Apui.	Apui.	Apui.	Apui.
Fish.	Ikan.	Lauk.	Kayanu.	Pait.	Lawit.	Sadar.
Flesh.	Daging.	Isi.	Ausi.	Asi.	Asi.	Isi.
Flower.	Bunga.	Bunga.	Usak.	Usak.	Usak.	Usak.
Fly.	Lalat.	Lalat.	Laugau.	Balougad.	Balougad.	Lalat.
To fly.	Terabang.	Terabang.	Tamulud.	Mausiam.	Mausiam.	
Foot.	Kaki.	Kaki.	Gakun.	Kaleiam.	Kaleiam.	Batis.
Fowl.	Ayam.	Ayam.	Manuk.	Manuk.	Lal.	Manuk.
Fruit.	Bua.	Bua.	Bua.	Bua.	Bua.	Bua.
Go.	Pergi.	Pergi.	Magiduk.	Magiduk.	Burra.	Mogud.
Gold.	Uras.	Auras.	Malawan.	Mulawan.	Mulawan.	Amas.
Good.	Baik.	Baik.	Mubalut.	Mausui.	Doh.	Mausui.
Hair.	Rambut.	Rambut.	Abuk.	Abuk.	Apuk.	Abuk.
Hand.	Tangan.	Tangan.	Kariam.	Kalindo.	Pichok.	Tangan.
Hard.	Kras.	Kras.	Mukadan.	Mukatang.	Mukatang.	
Head.	Kapala.	Kapala.	Ulu.	Ulu.	Ulu.	Ulu.
Honey.	Ayer madu.	Ayer madu.	Roh.	Dudúh.	Upa.	
Hot.	Panas.	Augat.	Malassa.	Malassu.	Maiún.	Malassu.
House.	Rumah.	Rumah.	Walai.	Baloi.	Rumah.	Aloi.
Iron.	Besi.	Basi.	Basi.	Basui.	Basui.	Besi.
Island.	Pulo.	Pulau.	Pulau.	Pulau.	Pulau.	Pulau.
Knife.	Pisau.	Pisau.	Pisau.	Kujang.	Iyo.	Pisau.
Large.	Besar.	Besar.	Megayu.	Mayu.	Mayu.	Megayu.
Leaf.	Daun.	Daun.	Ranu.	Dadanu.	Dadanu.	Daun.

Little.	Kachil.	Damit.	Kanak.	Bobodok.	Madari.	Diok.
Louse.	Kutu.	Kutu.	Kutu.	Kutu.	Kutu.	Kutu.
Man.	Orang laki.	Laki laki.	Miánei.	Ngkúyong.	Ngkúyong.	Mianei.
Mankind.	Manusia.	Jelama.	Ulun.	Ulun.	Damulun.	Ulun.
Mat.	Tikar.	Lampit.	Lampit.	Lampit.	Lampit.	Ikam.
Monkey.	Moniet.	Ambuk.	Karé.	Jebulau.	Basuk.	Kara.
Moon.	Bulan.	Bulan.	Bulan.	Bulan.	Bulan.	Bulan.
Musquito.	Nyamok.	Rangit.	Namok.	Namok.	Tukong.	Kalias.
Mother.	Ma.	Mama.	Ina.	Bina.	Tinan.	Ina.
Mouth.	Mulut.	Mulut.	Kabang.	Kabang.	Tahang.	Kabang.
Nail (finger).	Kuku.	Kuku.	Sandúlu.	Sandulu.	Sandulu.	Salindu.
Nail (iron).	Paku.	Paku.	Paku.	Paku.	Paku.	Paku.
Night.	Malam.	Malam.	Jutuong.	Dundum.	Mora-chapchan.	Autuong.
Nose.	Hidong.	Hidong.	Adong.	Adong.	Isong.	Orong.
Oil.	Miniak.	Miniak.	Uman.	Uman.	Uman.	Uman.
Pig.	Babi.	Bai.	Baiyo.	Basing.	Bakar.	Ramu.
Post.	Tiang.	Tiang.	Tiang.	Tiang.	Tiang.	Tiang.
Prawn.	Udang.	Siar.	Sasangan.	Sasangan.	Udang.	Siar.
Rain.	Ujan.	Ujan.	Rasam.	Ruanang.	Udan.	Rasam.
Rat.	Tikus.	Tikus.	Lano.	Lano.	Labo.	Tikus.
Red.	Mirah.	Mirah.	Maragang.	Malia.	Masia.	Malagang.
Rice (in husk).	Padi.	Padi.	Hilod.	Bilod.	Padi.	Parai.
Rice (raw)	Bras.	Bras.	Wagas.	Bagas.	Bara.	Wagas.
Rice (boiled).	Nasi.	Nasi.	Nitaid.	Kalo.	Noba.	Nubur.
River.	Lungei.	Lungei.	Barwan.	Lungei.	Lungei.	Barwan.
Road.	Jalanan.	Jalanan.	Lalan.	Dalan.	Dalun.	Lalan.
Root.	Akar.	Akar.	Wakan.	Bakag.	Bakag.	
Saliva.	Ludah.	Ludah.	Jula.	Tiowag.	Tiowag.	
Salt.	Guram.	Sirah.	Usi.	Usi.	Tichu.	Usun.
Sea.	Laut.	Lautan.	Lisabar.	Bugus.	Laud.	Lautan.
Silver.	Pirak.	Pirak.	Pirak.	Pirak.	Pirak.	Pirak.
Skin.	Kulit.	Kulit.	Kongkong.	Kongkong.	Tobil.	
Smoke.	Asap.	Asap.	Lisun.	Lisun.	Lisun.	Lisun.

VOCABULARIES OF NORTH BORNEAN LANGUAGES—*continued.*

English.	Malay.	Brunei Low Dialect.	Bisaya.	Murut Padas.	Murut Trusan.	Dali Dusum, near Limbang.
Snake.	Ular.	Ular.	Nipo.	Nipo.	Kukus.	
Soft.	Lembeh.	Lumbut.	Maluyat.	Maluyat.	Maluyat.	
Sour.	Masam.	Asam.	Ausam.	Ausam.	Bualum.	Unsom.
Spear.	Lambing.	Bujak.	Andewan.	Bangkow.	Bangkow.	Bangkow.
Star.	Bintang.	Bintang.	Bintang.	Motitiu.	Motitiu.	
Sun.	Mata hari.	Mata hari.	Matuadan.	Matuadan.	Matuadan.	Matuadau.
Sweet.	Manis.	Manis.	Matanus.	Mamis.	Mamis.	Manis.
Tongue.	Lidah.	Lidah.	Dilah.	Dilah.	Dilah.	Dilah.
Tooth.	Gigi.	Gigi.	Nipun.	Nipun.	Nipun.	Ipun.
Water.	Ayer.	Ayu.	Waig.	Timug.	Upa.	Aig.
Wax.	Lilin.	Lilin.	Lilin.	Lilin.	Lilin.	Lilin.
White.	Puti.	Puti.	Mapurak.	Mapurak.	Buda.	Purak.
Wife.	Bini.	Bini.	Sau.	Andu.	Andu.	Anau.
Wing.	Sayap.	Sayak.	Alad.	Alad.	Alad.	
Woman.	Perampuan.	Bini bini.	Aiyunai.	Dalâh.	Anak adi.	Kakimu.
Wood.	Kayu.	Kayu.	Kayu.	Kayu.	Kayu.	Luton.
Yellow.	Kuning.	Kuning.	Masilo.	Masilo.	Masilo.	Kuning.
Green.	Ijan.	Gadong.	Matamu.	Matamau.	Batamau.	Biru.
Yes.	Iya.	Au.	Aw.	Iyo.	Maw.	Aw.
No.	Tida.	Dada.	Kaissa.	Kalu.	Naam.	Unjap.
Seek.	Chari.	Unjar.	Chari.	Chari.	Chari.	Gium.
Find.	Dapat.	Beluri.	Makuanang.	Makabanang.	Makabanang.	
Like this.	Bagini.	Damiani.	Manu.	Koang dagino.	Koang dagino.	Miano.
Like that.	Bagitu.	Damiato.	Manu.	Koang dagino.	Koang dagino.	Miono.
Formerly.	Lagi danlu.	Lagi kurato.	Dalaid.	Dalaid.	Irat manu.	
If.	Kalan.	Amun.	Tau.	Tanah.	Namkaliku.	Amun.
To sail.	Berlayer.	Berlarei.	Lumayag.	Lumayag.	Lumayag.	Lumayag.
To run.	Berlari.	Berlusir.	Menjmbul.	Kamimbul.	Mangalow.	Semimbul.

Ghost.	Antu.	Antu.	Ragun.	Kalaganang.	Bintanan.	Lamatai.
Corpse.	Bangkei.	Mayat.	Bangkei.	Bangkei.	Bangkei.	
To mix.	Berchampur.	Bergaul.	Nigaul.	Nigaul.	Nigaul.	
Naughty.	Nakal.	Gauk.	Makagauk.	Makagauk.	Makagauk.	
Angry.	Marah.	Guss.	Mausiol.	Simaugit.	Simaugit.	Masiau.
Tray.	Dulang.	Talam.	Talam.	Talam.	Talam.	Talam.
Winnowing sieve.	Lusuran.	Nira.	Lilibu.	Lilibu.	Tapau.	
Common sieve.	Ayakan.	Ayakan.	Gagan.	Agang.	Agang.	Ayagang.
To pull an oar.	Berdayung.	Berkayu.	Niboasi.	Maugkabil.	Boi.	
Blind.	Buta mata.	Pachah mata.	Balan.	Balan.	Mabusa.	
To break.	Pichah.	Pachah.	Nabila.	Napopog.	Napopog.	Bila.
To lie.	Boung.	Kalaka.	Umboi.	Mabanaban.	Mabanaban.	Bawa.
To sleep.	Tidor.	Tidor.	Modap.	Modop.	Modop.	Modap.
To lie down.	Baring.	Limpong.	Lumanag.	Lumanag.	Talobid.	
To get up.	Berdiri.	Bangun.	Umberigud.	Umberigud.	Umberigud.	Tamidong.
To awake.	Bangun.	Bangun.	Tamidoug.	Tumidong.	Tumidong.	
Bottle.	Botul.	Surai.	Surai.	Surai.	Surai.	Surai.
Tin and lead.	Timah.	Timah.	Andurei.	Andurei.	Samasak.	Pandurei.
To meet.	Jumpa.	Bertamu.	Minta tamu.	Beramu.	Manamu.	
Headcloth.	Dastar.	Dastar.	Lugak.	Ligah.	Ligah.	Lingal.
Neck.	Leër.	Leher.	Liau.	Liau.	Liog.	Liog.
Different.	Lain.	Masing.	Luei suei.	Masu suei.	Masu suei.	
Here.	Disini.	Disini.	Liti.	Liti.	Matangi.	
There.	Disana.	Nun.	Lino.	Nog-i-niu.	Noginiu.	
That.	Ito.	Ato.				
Large.	Besár.	Báhsa.				
Small.	Kechil.	Damit.	.. ..	Kachia.		
This.	Ini.	Ani, or Ano.				
Testicles.	Palir.	Palir.	.. ..	Balak.		

Sixth Meeting, February 12th, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Dr. S. Hill; Lieut. R. Beavan.*

ELECTIONS.—*Capt. Donald R. Cameron*, R.A.; *Commander B. J. Cooper*, R.N.; *C. W. Eddy, Esq.; Edward F. Buttemer Harston, Esq.; James Monteith, Esq.; — Reynold, Esq.; W. Vilett Rolleston, Esq.; George Tinline, Esq.*

ACCESSIONS TO THE LIBRARY FROM JAN. 22ND TO FEB. 12TH.—'United States Geological Exploration of the Fortieth Parallel.' With Atlas. Washington, 1870. Donors the United States Senate. 'Notes on the recent Progress of Botany in Denmark.' By Robert Brown. 1872. 'Die Geographische Verbreitung der Coniferen und Gnetaceen.' Von Robert Brown. Gotha, 1872. Donor the author. S. W. Silver's 'Handbook to South Africa.' Donor S. W. Silver, Esq. A further Donation of 160 Geographical Memoirs and Papers, by K. R. Murchison, Esq.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING OF 22ND JAN.—Stieler's Hand-Atlas. Parts 3, 4, and 5, each containing 3 Maps. Presented by Justus Perthes, Esq. Spruner's Hand-Atlas. Parts 3 and 4, each containing 4 Maps. Presented by Justus Perthes, Esq. Maps of the Government Survey of India. 27 in number, on 117 sheets. Presented by Her Majesty's Secretary of State for India. A collection of Atlases and Maps, forming the Library of the late President, Sir R. I. Murchison, K.C.B., consisting of 4 Atlases and 30 Maps of various parts of the World. Presented by K. R. Murchison, Esq. 8 Maps from 'Petermann's Geographische Mittheilungen.' Presented by Dr. A. Petermann. 2 Maps of China, in Chinese characters. Presented by H. G. Hollingworth, Esq. MS. rough sketch of the Cross and Old Calabar Rivers and Creeks. Presented by Captain J. B. Walker, F.R.G.S.

LIVINGSTONE SEARCH AND RELIEF EXPEDITION.

The PRESIDENT stated that since the last meeting of the Society, three weeks ago, the Livingstone Search and Relief Expedition had been completed and equipped, and that it had sailed from the shores of England three days previously. The Council had thus shown their desire to act in this matter with the utmost rapidity compatible with efficiency. They had secured the services of

three very excellent gentlemen, Lieuts. Dawson and Henn, of the Royal Navy, and Mr. Oswald Livingstone, the son of Dr. Livingstone, and had supplied them with a good outfit, a set of excellent instruments for observations of heights and positions, besides suitable presents to be given to the Sultan of Zanzibar and chiefs of the African tribes. Up to the present time the subscriptions received from the public for this purpose amounted to nearly 5000*l.*, of which Glasgow had contributed 1000*l.*, Edinburgh 350*l.*, and Hamilton, where Dr. Livingstone once dwelt, upwards of 200*l.* The Government had also permitted the Council to avail themselves of a balance of 650*l.*, which remained in the hands of the Consul at Zanzibar, from the 1000*l.* which had been originally granted for the purpose of sending supplies to Dr. Livingstone. One hundred guineas had been received from the Corporation of London. With regard to the sums expended, 800*l.* had been devoted to the outfit of the Expedition, in providing their passages and in furnishing them with presents for the African chiefs. The Council had also informed Dr. Kirk at Zanzibar that 2000*l.* might be drawn to start the Expedition into the interior. There would then be about 2000*l.* remaining in reserve for the return of the Expedition and for future contingencies.

It would be gratifying to the Society to learn how cordially some departments of the Government supported the Expedition. Lord Granville, on behalf of Her Majesty, had forwarded a letter to the Sultan of Zanzibar to the following effect:—

"SIRE, "Foreign Office, February 3, 1872.

"I beg leave to present to your Highness the bearer of this letter, Lieut. Llewellyn Dawson, of her Majesty's navy, and his companions, who have been selected by the Royal Geographical Society of England to proceed to your Highness's dominions in command of an Expedition which has been organized and despatched for the relief of Dr. Livingstone, the distinguished explorer, of whom no tidings have been heard for a long time, and the uncertainty of whose fate, among wild tribes in the interior of Africa, causes great anxiety to the English people.

"I feel assured that your Highness will sympathize with this noble object, and will render all the assistance in your power in furtherance of the Expedition; and that you will issue your powerful commands to the chiefs and tribes on the coast within your jurisdiction, and to those in the interior with whom you have influence, enjoining them in every way to aid and assist its progress into the interior.

"By so doing your Highness will merit and obtain the cordial thanks of her Majesty the Queen, of her Government, and of the whole British nation.

"Commending your Highness to the protection of the Almighty,

"I have the honour to be, with profound respect, Sire,

"Your Highness's most obedient, humble servant,

(Signed) "GRANVILLE."

"*To His Highness Seyd Burgash,*
Sultan of Zanzibar, &c., &c., &c."

The Foreign Office had also commended the Expedition to the care of Dr. Kirk in the following terms:—

"SIR, "Foreign Office, January 29, 1872.

"This despatch will be delivered to you by Lieut. Llewellyn Dawson, R.N., who has been selected by the Royal Geographical Society to proceed to Zanzibar, in command of an Expedition which they have organized and despatched for the relief of Dr. Livingstone.

"The Expedition is a private one, but her Majesty's Government take the greatest interest in its success, and I have to instruct you to give Lieutenant Dawson all the advice and assistance in your power in furtherance of the object of his mission. Your local knowledge and experience, and your acquaintance with the interior of Africa, may render your advice of great value.

"I have further to authorize you to advance any sum that may be required for the purposes of the Expedition, within the limit of the balance remaining in your hands of the Government grant of 1000*l.* in aid of Dr. Livingstone, which, from the account sent home by you in February last, then amounted to about 654*l.*; and I have further to desire that you will not fail to communicate to her Majesty's Government any intelligence that you may from time to time receive of the progress of the Expedition.

"I am, Sir, your most obedient, humble servant,

(Signed) "GRANVILLE."

"*Dr. Kirk, Acting British Consul, Zanzibar.*"

The PRESIDENT then stated that a letter had been received, reporting the arrival at Zanzibar of a mission from the King of Uganda,* which it was to be hoped would, on its return, furnish a favourable escort to the Expedition for a considerable distance into the interior. Hitherto everything had been *couleur de rose* in connexion with the Expedition. It was most fortunate that a steamer should have been about to sail direct to Zanzibar, *viâ* the Suez Canal. Besides this, on the 12th of last month the Council sent a telegram to General Tremenheere at Aden, asking him to send on to Dr. Kirk, by the first opportunity, advice that the Expedition was coming, and that he might draw on the Society for 500*l.*, for the purpose of making preparations at Zanzibar. That telegram, sent from London in the middle of

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* "Zanzibar, Oct. 13, 1871.

"I have the honour to report that a body of men, bearing upwards of fifty fine elephants' tusks, a present to the Sultan of Zanzibar, in return for things sent two years ago by the late Seyd Majid, has arrived from Uganda, the country described by Speke and Grant as ruled by the despotic Chief Mtesa, son of Sunna.

"The Chief of Uganda desires to keep up the trade-route to Zanzibar, but he demands very considerable returns for what he has sent down.

"The messengers, for whom there is no very competent interpreter here, and whose knowledge of Suaheli is limited, speak of traders from Egypt having come by the Nile and quartered themselves close to the town of Mtesa. In fact, Uganda is now reached by traders from both north and south; and the Zanzibar caravans which have lately visited the Victoria Nyanza by way of the Masai and Jagga country have there met with people of Uganda on the eastern side of that lake.

"The recent troubles in Unyamwezi, which I have elsewhere reported, if of long duration, may tend to open up the eastern route, which is certainly the nearest and most direct, although dangerous from passing through the lands of the wild Masai.

"JOHN KIRK."

the day, reached Aden the same evening, when a vessel was in the roads on the point of starting to Zanzibar. The telegram was sent on board, and the vessel left Aden at daylight on the 13th. In all probability, the intelligence would reach Dr. Kirk in fourteen or fifteen days; and if so, it would certainly be the most rapid transmission of intelligence to Zanzibar that had ever occurred. It was to be hoped that fortune would continue to favour the Expedition, and that in a year or so Dr. Livingstone would be back in England.

The PRESIDENT then made an announcement regarding Sir Samuel Baker's Expedition to the Upper Nile. A few days ago the private secretary to the Prince of Wales had sent the following note to him:—

"DEAR SIR HENRY, "Sandringham, King's Lynn, February 6, 1872.

"The Prince of Wales has directed me to send you the enclosed letter received this morning from Sir Samuel Baker. A copy of it has been forwarded to the 'Times,' in case the editor should consider it to be of interest for the general public.

"But His Royal Highness, as a member of the Royal Geographical Society, thinks that you, as the President, might like to see the original of this interesting account of the progress of an Expedition, which promises to furnish such important results regarding the advancement of geographical knowledge.

"With the request to be good enough to return the letter at your convenience,

"Believe me, dear Sir Henry, yours very faithfully,

(Signed) "M. HOLZMANN."

"*Major-General Rawlinson, K.C.B.*,"
&c. &c. &c.

The letter alluded to, having already appeared in the 'Times,' was not read to the meeting.

The PRESIDENT reminded the meeting that it was owing to the personal exertions of the Prince of Wales that Sir Samuel Baker was enabled in the first instance to organise the expedition for the exploration of the Upper Nile, and therefore the credit of any geographical results which might ensue would be originally due to his Royal Highness. The following letter from Colonel Stanton, dated Cairo, January 21, 1872, contained the latest intelligence received by the Foreign Office from Sir Samuel Baker:—

"I have the honour to inform your Lordship that I have received intelligence from Sir S. Baker up to the 22nd of October last, at which date he was 20 miles north of Gondokoro, on the White Nile.

"Sir Samuel reports that the Expedition had encountered the greatest difficulties in making their way through the Bahr el Giraffe to the White Nile, having been obliged to cut channels and drag the vessels over shallows for a great distance. He had started from Tewfikeeya, in lat. 9° 26′, on the 11th of December, 1870, with the rear of fifty-nine vessels, reaching Gondokoro, in lat. 4° 55′, with his own steamer, and Diahbeah on the 15th of April; but it was not till the 22nd of May that the entire flotilla had reached that place.

"Sir Samuel took formal possession of the country in the name of the Khedivé, and endeavoured to induce the natives (the Bari tribe) to submit to his government. These, however, refused compliance, and commenced hostilities against the Expeditionary force; whereupon Sir Samuel declared war on them, and had since been engaged in endeavouring to bring them to reason.

"The Expedition has been short of supplies, and the troops placed upon

reduced rations; but at the latest date Sir Samuel had taken possession of a most fertile portion of the Bari country, where he found abundance of corn, and expressed himself as tolerably easy in his mind on that point.

"The Englishmen attached to the Expedition were in good health, but Mr. Higginbotham, the chief engineer, had suffered severely from fever."

The following paper was then read by Sir HARRY PARKES, British Minister at Japan:—

Journey round the Island of Yezo. By Capt. T. BLAKISTON, R.A., F.R.G.S.

SIR HARRY PARKES introduced the subject with some prefatory remarks descriptive of the general character and condition of the island of Yezo. It is the northernmost of the large islands which form the Empire of Japan. According to a calculation made since the recent running survey of the coast by H.M.S. *Sylvia*, it contains 34,605 square miles, and is therefore larger than Ireland. In population it is sadly deficient, and, in the absence of a census, 150,000 or 160,000 is probably a just estimate of the total number of Japanese and Ainos. The latter probably do not exceed 25,000 or 30,000. The presence of this aboriginal race in Yezo, and the circumstance of Hakodadi, the capital of the island, being a port open to foreign trade, are features which give to the subject material interest from a foreign point of view.

Hakodadi was first opened to foreigners under Commodore Perry's Treaty of 1854, as a port of supply for the whalers which frequent the sea of Okhotsk. A foreign trade, which in 1869 had increased in imports and exports to nearly half a million sterling, has since gradually grown up.

It is not a trade, however, which, under the present circumstances of the island, admits of much expansion. Exports are confined almost entirely to the produce of the fisheries. Large quantities of sea-weed, fish, *irico* (sea-slug) and *awabi* (haliotis tuberculata) are collected both for home consumption and for exportation to China, where all edible marine products are in great request. Of the commonest kinds of fish, such as salmon and herring, large quantities are salted down, while the latter is extensively made into oil, and the refuse exported as manure. Labour is much needed, as the island, although possessing a rich soil, does not at present grow its own supplies. The greater part of the Japanese population are such as migrate to Yezo during the fishing season, and return at its close to their homes on the main island. It is very important for the future welfare of the island that the Governor should encourage the permanent settlement of agriculturists, and should also take steps for the

development of its rich mineral resources, which have hitherto been almost entirely neglected.

It is surprising to note how slow has been the course of progress in Yezo. The Ainos, who contested the possession of Japan with the first outside settlers (whose immigration appears to have commenced about seven centuries before our era), found in Yezo their last stronghold; but Yoshitsune, brother of the celebrated Shoqûn Yoritomo, established himself as ruler of the island at the close of the twelfth century. Its present condition probably presents but little advance on that in which he found it; and, under the harsh treatment hitherto observed towards them by their Japanese rulers, the Aino population must have materially diminished. These people present a very interesting subject of ethnic enquiry. In feature and in language they differ altogether from the Japanese, and are regarded by the latter as an alien and a subject race. No attempt has been made by their rulers to raise their social condition; they have no written language, and therefore possess no records of their past and highly ancient history. Their features indicate a wholly different origin to Japanese, Chinese, Mongols, Mantchus or Tibetans. While these races have beardless and hairless faces with oblique eyes, the Ainos, on the other hand, are distinguished by a profusion of coarse black hair which hangs from their heads in heavy unkempt masses, and mingles with the thick moustachios and beards which fall almost to the waist. Their eyes are large and round, of glistening black; their cheek-bones are not prominent, while their noses are large and well shaped. Their bodies, however, look thin and weak, they have a shambling gait, and their shrinking subservient air is expressive of a long period of oppression, and an utter absence of culture. They make their own coarse garments from the bark of trees. They are wholly employed in the fisheries or the chase, receiving rations and some clothing from their Japanese employers, but no pay, which would be valueless to them. They have not even been encouraged to engage in agriculture, and their settlements are for the most part confined to the sea-coast. Although many of the men are good-looking, the women are generally uncomely, and add to their unattractiveness by tattooing their lips.

Previous to the journey undertaken by Capt. Blakiston, only the southern parts of Yezo had been visited by foreigners, and it was by virtue of a commission entrusted to him by the Japanese Government that he was able to perform the circuit of the island. He proceeded by ship to Akis and Hamanaki on the east side, and landing at the latter point, proceeded by land from thence to

Hakodadi, having thus traversed 895 miles of almost unexplored ground. The want of funds obliged him, in most cases, to follow the coast-line. He travelled chiefly on a packhorse, in the simplest form, contenting himself only with the food of the country, salmon and rice, but meeting with the kindest treatment from all classes of the people, whether Japanese or Ainos, with whom he came in contact.

The fisheries along the whole coast are farmed out and divided into stations, each of which possesses its head-quarters or Quaisho, where the farmer or his agent resides, and where entertainment and accommodation are provided for travelling officials. The following description of the first one at which Capt. Blakiston put up when at Akis, is a type of those met with throughout the island.

"The principal house at the Quaisho is built in the ordinary Japanese style, but is of far larger size than usually seen in the towns, and everything about it seems large in proportion. At one end of the building are several apartments, fitted up with papered sliding doors and windows, for the accommodation of Government officers and distinguished travellers. In the middle is a large room with an open hearth, of sufficient dimensions to take on large logs of firewood, round which the Ainos and lower people of the establishments squat cross-legged, smoking and chatting, when they have nothing to do. An office is half-closed off from this place, and the kitchen is on the other side. Outside the back door are large cauldrons, used for heating water for washing and various purposes, and for filling the warm baths, so indispensable in a house where travellers are entertained. The ground before the house is neatly levelled, and enclosed in the form of a quadrangle by a sod-bank, in which are two gateways, with posts and upper cross-bars, painted black in the usual official style.

"Separated from the principal house, are carpenters' shops, boat-sheds, houses for some of the Ainos, and storehouses for the reception of rice, saki, rope, straw-mats, nets, and other necessaries for carrying on the fishing business, and storing the produce of the fisheries."

At Akis, Captain Blakiston had an opportunity of observing the sea-weed fishery, which he thus describes:—

"After remaining a few days at the Quaisho, the *Akindo* was moved about five miles down the bay, and anchored off Ko-Daikoku Sima in seven fathoms, where, being favoured by remarkably fine weather, a part-cargo of sea-weed was loaded. This article is one of the greatest exports both for the native and China

markets from Yezo. It is collected in many parts of Japan, but the great source of the favourite kinds is the south-east coast of Yezo. Requiring simply the labour necessary to collect and dry it, this business is, probably, the most lucrative of any followed by the fishermen of the north. The season extends from the sixth to the ninth month, say July to October, during which time a large number of people are kept constantly employed. In its fresh state the weed is in appearance much the same as the 'kelp' of Britain, in lengths of from 20 to 40 feet. The mode of collecting it is for three or four men, according to the size of the boats, to work together. In the case of three, two go out in a skiff in fine weather between and about the reefs and islands, and fish up the weed by means of a pole with a crook on it, while their comrade remains on shore in charge of their straw hut, cooking, and looking after the sea-weed lying out to dry. On getting a full boat-load, they return and haul out the sea-weed on the beach, laying out the strips in parallel lines to dry on the sand. Every evening, or, in the event of rain, it is either housed, or collected in heaps and covered with mats. Two or three days of fine weather suffice to dry it, after which it is cut into lengths usually 3 feet 9 inches, and tied in bundles of half a picul each. A continuance of wet weather will cause the sea-weed, before it is sufficiently dried, to heat and spoil, when it has to be thrown away. Both Japanese and Ainos are employed by the fishing-masters for this service. The former are engaged by the season at Hakodadi, in June, and sent up the coast in junks or by land. Their usual pay is ten rios for the season, with food, and an additional ten rios between three of them if they make in the season 100 kokus (of 3 cwt. each) of dried weed, which they can usually do in a favourable summer. Including superintendence, food, mats, wear and tear of boats, and other plant, I calculate the prepared sea-weed to cost about 110 rios for 100 kokus. To this has to be added the Government duty, which hitherto has not been fixed by any certain tariff, but each fishing-master has paid an annual sum as rent for a certain part of the coast. Under the new 'Kaitago' regime, this duty, in the districts retained by the Government, is now fixed at thirty per cent. of all produce, with an additional six per cent. on arrival at Hakodadi. Selling on the coast, the fishing-masters always make one hundred per cent., and frequently two hundred per cent. of profit; so it is not astonishing that the principal men who have engaged in this business since the opening of Japan to foreign trade, have become mostly rich. The exports of this article from

Hakodadi in foreign bottoms alone, amounts to over one hundred thousand piculs per annum, equal to 6000 tons."

During his journey, Capt. Blakiston had frequent opportunities of observing the Ainos, of whom he furnishes the following general account:—

"The dwellings of the Ainos in all parts of Yezo are pretty much of one form, being composed of one inner chamber and a sort of porch. The roofs slant to the ground, with a chimney at the end over the porch, and an open hearth below it. They are composed of light poles, covered with birch-bark and thatched with reeds, grass, or scrub-bamboo. A small store-hut, either of the same materials or of wood, raised some feet above the ground, stands alongside; and usually some strong wooden cages, likewise raised on stakes, containing pet bears and eagles, for which these people seem to have some superstitious veneration. Numerous half-starved dogs are invariably loitering about.

"The men are usually stout well-made people, of lowish stature, with very heavy bodies. The hair of the head and beard is commonly allowed free growth, although in some districts many of them follow Japanese fashions in this respect. A well-fed male Aino is not a bad specimen of humanity, but the women are not to be compared with the men. They seem to age very soon, and get shrivelled up in their features; this, perhaps, is caused partly by the hard work they undergo, as they carry wood and water and perform most other menial services. I have, however, seen some young girls very good looking, save and except their lips, which are invariably tattoed, a fashion, I fear, it would take some time to become so familiar with as to admire. These people are all subsisted at the expense of the 'Okiyainin,' the lessee of the fishing-coast from the Government. They receive a daily allowance of about a quart, or a little over a catty, of dry rice per head. The able-bodied men, women, and boys, work at fishing, cutting and hauling timber and firewood, carrying produce, or as servants attending to house and general work about the stations. They likewise hunt, and, as may be imagined, are expert at taking bears, deer, foxes, &c.; but the produce of the chase has to be delivered up at the Quaisho, for which a small remuneration is made them in presents of cotton-cloth, thread, saki, tobacco, and such like. They generally hunt with bows and arrows, but a few match-locks are lent them from the Quaishos. The women employ part of their time in manufacturing a coarse kind of cloth called 'Atzis,' made from the inner bark of a tree which grows in the country. Some of the men are pretty fair carpenters. Their proper language is

very different from Japanese, having many words ending in consonants, the entire want of which is a peculiarity of the latter language. The tone of voice of the men is by no means unsonorous, while that of the women is a clear falsetto. In pulling boats or hauling at nets they almost invariably sing, and frequently when at work keep up a constant jabber, laughing at one another's jokes,—doubtless, the effect of their dependence on their masters, and the little need of forethought causes the cares of life to press lightly on them, for they are a very lively people. Most of those I met spoke Japanese, more or less, but the usual language in which the Japanese speak to them is a mixture of the two. As clothing they generally wear a loose 'Atzis' coat, bound round the waist by a girdle of some sort, and a breech-cloth, to which, in cold weather, they add leggings and deer-skin mocassins, with a deer-skin overcoat, mittens, and a warm cap, covering the ears and back of the neck. In summer, however, their brown skins are oftener exposed than otherwise, shewing their extremely hairy legs, whilst the thick long crop of hair on the head and full beards are sufficient proof against ordinary weather."

In only one instance did Capt. Blakiston find the Ainos engaged in agriculture. This was in Volcano Bay, where he observed that they grew successfully, millet, potatoes, turnips, and other vegetables. This fact, and the following account of his Aino guide, shew that this peculiar race possess a degree of natural intelligence and courtesy which denotes considerable capacity for improvement, when the opportunity of advancement is extended to them.

"As I sat over the fire, before turning into my blankets for the night, my Aino kept me in constant conversation, being anxious to gain information about foreign countries, which he called Kara; and, being able to write the Japanese Katakana (he was the only one I met whom I discovered could do so), he put down English names for various things, and spelt them over and over again to himself to get them by heart. This boy accompanied me all the way to Soya during eight days' travel, and during that time worked every night at his vocabulary. He must have had a very retentive memory, for I do not remember that he ever asked the name of the same thing twice, unless it was that there was some indistinctness in the characters he had written, or he wanted to make sure of the pronunciation, which was not to be wondered at, considering that, when without his brush and ink, he made shift with pieces of charcoal out of the fire to write with. He was so civilized an Aino that at first I doubted whether he was certain as to his parentage; but a peculiar pronunciation, his dark heavy eyebrows, and

the general contour of his features, convinced me he was of pure stock."

Their mode of salutation is given in the following paragraph:—

"My Aino was a stranger to these people, so on meeting, before exchanging a word, he went through a ceremonious form of salutation individually with each of the principal men. This they performed by going down on their knees, and holding out their hands with the palms together, rubbed them back and forwards twice, the *saluted* party following the motions of the *saluting* one; then they raised both hands to a level with the chin, palms uppermost, lowered them, raised them again, stroking the beard, lowered them, and performed the last operation over again, which completed the ceremony."

The character of the roads or tracks along which he travelled, and which, when these deviated from the coast, lay either through thick woods, or over immense lagoons, may be gathered from the following account:—

"Often I had to leave all to the horse, contenting myself with shielding my face from blows of branches of trees, and holding on with the other hand to the cantle of the saddle, to keep myself in position when descending the steeper places. Frequently my horse almost lost its footing, and had to make a sudden rush down the steep mountain-side in order to keep on its legs, the impetus carrying him at times so far that I thought he must either roll over or continue his slide to the bottom.

"The worst part of the swamps have timber laid transversely, forming a narrow 'corduroy' road; or broad rough planks are laid lengthwise. Sometimes turf, gravel or sand is put on the top for ballast, but usually such is dispensed with, and, being in miserable repair, these kinds of roads are not the best for horse travelling. They are, however, the only attempts at roads in any part of the island, and are never resorted to unless the natural state of the country is such, that travelling would otherwise be almost impossible. Elsewhere the sea-beach, or the rough mountain-side, with the trees cut away sufficiently to allow of the passage of pack-horses in single file, are the 'roads' of Yezo. It is to be hoped that, as the attention of the Government is now directed to the improvement of the country, one of their first measures may be the establishment of lines of communication, so essentially necessary to the development of its resources."

After nineteen days' travel, Capt. Blakiston reached Soya, the northernmost point of Yezo, arriving there on the 24th October. Soya is an important station, as it is the point from which the

passage is made to Siranosi in Saghalin, across the La Perouse Straits, a distance of 18 ri or 54 miles. Being pressed for time, on account of the lateness of the season, Capt. Blakiston only halted one day at Soya, and then proceeded south. The 'fall' colours of Yezo, which are very beautiful, are thus adverted to:—

"I felt," he says, "that it was none too early to turn southwards, for the weather was getting cold, and my limited stock of baggage included little clothing suitable for cold weather. I therefore set out on the 26th, in company with a Japanese and an Aino.

"Leaving the bay, we turned up a valley towards the south-west, where we had some experience of plank and corduroy roads not in the best of repair. Mounting the hills by a fair cut horse-path, we travelled along plateau-like land, till we came suddenly to the brink of a steep high bank immediately above the Sea of Japan, where a fine panoramic view lay spread out before us. Looking to the southward, the view was bounded by a ridge of hills terminating on a low point, where a few houses, barely visible, marked the fishing-station called Bakai. From there the sea-beach swept with a gentle curve to our feet, with a narrow strip of lowland intervening between it and the partially-wooded hills, on which the hardwoods, in their brightest 'fall' colours, mixed with the deep-green firs, showed out in fine contrast with the light pea-green of the scrub-bamboo covering the hill-sides. The lateness of the season had turned the oak-leaves a deep rich brown, the birch yellow, and the mountain-ash the brightest lake colour, which with the berries of the last, a rich scarlet, and some of the grasses a violet hue, made up such a mixture of colours, and so beautifully distributed, that an artist would have been at a loss to exaggerate them. As I gazed on this scene, recollections of similar views in the more northern regions of America came fresh to my memory; but I believe I can say with truth I had never seen anything to excel the fall colours of northern Yezo."

The principal places on the west coast of Yezo, are the settlement at the mouth of the great Iskari River, and Otarunai, which is the port of the great valley watered by that river. On that account Otarunai, next to Hakodadi, may be said to be the principal point of interest to foreigners on the island. Capt. Blakiston furnishes the following description of that port:—

"The first occasion that I was at Otarunai was on the 3rd of November, having travelled that day from Iskari (9 ri) on horseback. Notwithstanding that I had heard it much spoken of by Japanese, I was struck with the place, not only for the picturesque nature of the locality, but with the many advantages it seems to

hold out as a place of settlement and a port of trade. The land, though hilly and diversified, has a sufficiency of level ground for building purposes, and fine slopes available for cultivation, while the hills and mountains afford pasture for horses and cattle, and an ample supply of wood. As an anchorage, the bay is capacious and well sheltered, with good bottom. A vessel can bring Takasima Head to bear north-east with six fathoms of water, shutting in Cape Ofuwi, which bears N.E. by N. ½ N., while the land on the far side of Iskari Bay is not distant enough to allow anything of a heavy sea to get up with easterly winds, and of course there is excellent protection from north round by west to the southward, from which quarters the heaviest blows may be looked for at all times of the year.

"The advantage of a good harbour, in fact the only one on the north-west coast of Yezo—the value of the productive fisheries on this part of the coast—the rich agricultural valley of the Iskari, for which it is the sea-port—and the excellent locality of the place for an extensive settlement—will, I believe, cause Otarunai to become a large place, second on the island only to Hakodadi.

"In 1869 the resident population of Otarunai and Takasima, which have hitherto been separate townships, was 3500 persons, which number in the fishing-season is increased to 6000.

"Otarunai proper, besides lining the shore of the bay, extends back on the slopes of a valley, and contains many houses of respectable appearance. Takasima is more a number of fishermen's houses scattered round the shore of the north-western part of the bay: it is, however, better situated as a place for working with shipping during autumn and winter, as the shore at Otarunai is somewhat exposed to northerly winds. The whole country in the neighbourhood is remarkably picturesque, the land rising gradually into high hills to the south and west, backed by wooded mountains. The hills and grass are covered with some scrub-bamboo, but this plant is not so prevalent here as in most other parts of the country. Some high precipitous bluffs overhang the sea, and relieve the uniformity of the shore-line, while a pretty cluster of pinnacles of rock stand a little detached from the high land between Otarunai proper and Takasima.

"The great resource of Otarunai hitherto has been its herring-fishery, the most productive on the whole coast of Yezo. The fish are exported in a dried state, as well as boiled for their oil; the residue, after extraction of the latter, being dried, is known under the name of 'Kasze,' or fish-manure, in which state it is shipped in large quantities to the South. The roe is likewise saved and dried.

Herring-fishing commences with the latter part of March. These fish, curiously enough, are not found on the Iskari shore. A certain amount of cod, awabi, irico, cuttlefish, and sea-weed, are taken during their respective seasons. Large quantities of firewood are required for boiling down fish. A great deal of it is brought from Iskari."

Iskari and the salmon-fishery, which forms the chief resource of the island, are next described.

"The mouth of the Iskari, having a northerly opening, is somewhat askew with the shore of the bay, which is in a line north-east and south-west. The next reach above the river runs parallel with the coast, and the town is situated on its left or western bank, between it and the sea, leaving an unoccupied flat sand-point strewn with drift-timber immediately at its mouth. The deep channel follows the bank along the town, where junks move five abreast, with gangway-planks laid ashore from the inside ones, where there is fifty to seventy-five feet of water. Above the town the river bends, and a long reach comes from the south-east. Its width opposite the town is about 300 yards, with a sluggish current. The 'bar' is a little outside the mouth, the channel over which is said to be rather crooked and variable, while the depth of water likewise varies, according to the season, from seven to twelve feet. When I was there, late in autumn, there was between nine and ten feet, allowing of the passage of the largest junks which trade to Yezo; but, later in the season, the prevalence of north-westerly gales and reduced currents of the river, cause the bar to silt up, it remaining shallow all winter till it clears again with the spring floods, caused by the melting of the snow in the interior, in April.

"There are some large houses and substantial godowns at Iskari, but a great part of the place is made up of temporary buildings, occupied only during the salmon season, when, besides the people actually engaged in fishing, a number of small traders and others resort thither, which, together with the presence of the junks—there were fifty-seven sail in the river when I was there—give the place during that time a busy appearance. The resident population in 1869, according to the Government records, was 350 Japanese and 430 Ainos; but, in autumn, the former was raised to 800, besides the crews of the junks, amounting to some 600 more men. The situation of the town is low, being on sandy soil but a few feet above the river or the sea. On the sea-side are a few low sand-mounds. The Government buildings and offices are on the opposite side of the river to the town, where there are a few other houses. A high outlook stands inside the Government enclosure, and there are some others in the town. The Government have

likewise some godowns for storing fish, &c., on the river-side at the upper part of the town. The Ainos live mostly in huts farther up.

"The salmon fishing, which is the great resource of Iskari, is carried on both inside and outside the river by sein-nets, which system is pursued at various stations up the river for a distance of fifteen to twenty miles, portions of which are let out by the Government to about thirty fishing-masters, while the Government retains for its own use certain parts, where they employ Ainos under superintendence of Japanese. The average catch of salmon on the Iskari (exclusive of the fish taken near its sources) is 20,000 koku, or 1,200,000 fish, equivalent to 50,000 piculs, or 3000 tons; but in some seasons considerably above this. The best fishing is about the mouth of the river, where 2000 fish are frequently taken at one haul, and outside in the sea sometimes as many as 16,000 are taken at once. The season of 1869 was a very indifferent one, so that the junks, representing about 30,000 koku, would probably be not above half-loaded. The fish are mostly not clean and silvery, but much discoloured, especially those caught up the river; they are, however, considered by the Japanese sweeter eating than the red-fleshed clean-run fish, but do not keep so well. By the junks they are carried to various ports on the west coast of Nipon, few coming into the Hakodadi market, as that place is supplied mostly from the east coast. The greatest obstacle to the salmon-fishing on the Iskari is the numerous 'snags' and drift-wood in the river, which greatly interfere with hauling the nets.

"The boats used in the salmon-fishery are large 'sampa' for running the nets, and small 'tsippa' (skiffs), or 'kawafune' (canoes), for other purposes—a 'sampa,' which is the usual form of large fishing-boats used round the whole coast of Yezo, and, I believe, not found in the south of Japan at all, is about 50 feet in length, by a breadth of 10 feet. Built with very great shear, high prow, and curved stem, they are good to ride in a sea, and easily hauled out stem foremost on the beach. Each boat carries a crew of about twenty men, sixteen of whom ply short oars in the fore-part; the skipper stands on a raised platform at the stern, guiding the boat with a large steering oar: two or three others attend to paying out the net, which is carried amidships; and when on the look-out for fish, as for shoals of herring, one stands right in the bow, leaning on the high prow, which is probably designed for that purpose. One hundred and fifty piculs (8 to 10 tons) is a fair load for one of these boats when carrying cargo. Japanese fishermen every year make long voyages in these large boats, when going to and returning

from the more distant fishing-districts; they are then built up with weather-boards, bamboo, and mattany, and carry a mast and sail. They have also on board rollers, small capstans, and gear for hauling out on the beach, which they are frequently forced to do when caught by bad weather on a coast where there is no shelter. These 'sampa' are certainly well adapted for the use they are put to.

"The smaller boats used on the coasts are the ordinary improved Aino 'tsippa' which the Japanese have adopted, having a flat solid bottom, plank sides, and square stem; but in rivers the Aino 'dug-out' canoes are more generally used. These are long narrow crafts, shaped out of a single tree, usually elm, and hollowed out tolerably thin. Bow and stern both overhang slightly. On the Iskari there are great numbers of them, where they are used for almost all purposes of river-navigation. The one in which I subsequently ascended this river was about 35 feet in length, with a breadth of 2 feet 9 inches. They are paddled by one, two, three or more persons, with narrow-bladed paddles usually about 6 feet in length, which are likewise used for poling in shallow water. Some Ainos use longer paddles. In paddling or poling, they stand up, except when taking it easily in going down-stream, when they frequently sit or kneel in the bottom of the canoe. The Ainos, like other savages, are very dexterous in the management of their canoes.

"Hitherto the Government has employed and fed most of the Iskari Ainos, or rather those inhabiting the lower valley, and they now use at their various fishing-stations about four hundred of these people, with fifty Japanese. In a good season they take 3000 koku of salmon, but as, besides subsisting the Ainos, they have on pay a number of idle yakonins, and these not being ignorant of the usual official mode of feathering their own nests, the Government makes little or nothing out of the business. During the fishing-season the allowance to the Ainos is one quarter of a sho of rice, an equal amount of saki and fish. At other seasons when they work for the Government they get the same allowance of saki, and double of rice in lieu of fish. On going into the woods to hunt, certain advances are made them, and they settle up."

Capt. Blakiston ascended the Iskari River, taking the southern branch at the point where it bifurcates. The importance of this stream may be gathered from the following particulars.

"A little before noon on the 19th November, I stepped into a canoe which lay ready alongside the bank of the river at Iskari. It was manned by three Ainos, and a young Japanese was in charge of the provisions, &c. Having taken off my boots, I made

myself snug in the bottom of the canoe, which was laid with clean mats, using my blankets for a covering, and the baggage piled behind supported my back. There was a small brazier containing a charcoal fire, which Japanese carry with them on all occasions when possible, more for the purpose of lighting their pipes than for anything else, although they have usually a small tea-pot with it. The Japanese laid himself down in the bottom of the boat, covered with his spare clothes and sleeping-quilts, and as the weather was cold, with more or less snow, he seldom showed himself after we first started. Each Aino handled a long paddle, with which they poled the boat along in shoal water near the bank, or paddled when the bottom could not be reached.

"We passed a number of fishing-stations, where the only buildings were straw huts. At many stations Ainos were working, superintended by Japanese, and at others Japanese alone. The country on either bank is one dead level, thickly wooded with large elm and other trees, with an under-scrub of dwarf bamboo, and willows on the lowest ground. The soil is entirely alluvial mud, without a trace of gravel, sand or stones. The concave banks, which are kept vertical by the wash of the river, were about 10 feet above the level of the water, and apparently constantly crumbling away.

"It is in this region that it is intended by the Government to form agricultural settlements, and, from what I could learn, the country and soil are well suited for such purpose. That this region is capable of producing wheat, oats, barley, maize, buck-wheat, millet, hemp, peas, beans, onions, turnips, beet, cabbage, potatoes, tobacco, and other vegetables and fruits of a temperate climate, I think there can be no doubt; for the soil seems remarkably rich, and the climate is certainly suitable for the growth of all the productions of the northern part of Nipon, except rice.

"That same evening an old Aino brought me a present of some fresh venison and a couple of salmon. I learned that he was chief of the Salsporo Ainos, about 500 in number. The Japanese who accompanied me had brought some saki on his own account for trading with on the river, and I therefore got him to serve out a liberal allowance, which I presented to the old man. He went through the usual form of throwing a few drops to the four winds, presented me and the Japanese in charge of the station with some in a formal manner, and then retired.

"The Iskari drains a much larger extent of country than any other river on the island. The northern branch has much the longer course, some of its waters being drawn from 70° latitude north, and its course cannot be less than 180 geo-

graphical miles above the junction, which would make its total length over 200 miles. The northern branch probably discharges considerably more water than the southern one; for the main river just below its junction is about 200 yards wide, while the south branch is only from thirty to fifty. This latter draws its waters principally from three large lakes, the southernmost one near to Taromai Volcano, and a great extent of swampy country in that district.

"Japanese have told me that a number of Ainos live on the north branch of the Iskari, there being a large settlement of these people some five days' travelling up it; and another five days above that, I met a Japanese who had been seven days up (say about 50 miles), where he described a great fall, so that the canoe has to be unloaded and hauled up by a rope, the baggage being carried overland to above the fall. We put up for the night at Tizi-Iskari, which is 25 miles from the sea."

From the head of the branch of the Iskari which he ascended, Capt. Blakiston crossed to Yubuto on the south coast, and his account concludes with an interesting description of the settlements around Volcano Bay, so-named from the presence of three fine volcanoes, all of which are in sight at once, and two of which, *Usui no yama* and *Komano taki*, are in active eruption. The shores of Volcano Bay and its vicinity are also particularly rich in mineral productions,—gold, silver, lead, iron, petroleum, and coal. Skirting the shores of Volcano Bay, Capt. Blakiston eventually reached Hakodadi on the 29th November, having thus accomplished, from the time of leaving Hamanaki (in Akis Bay), on the 6th October, a journey of nearly 900 miles.

Mr. WINCHESTER said he had been over part of the ground travelled by Captain Blakiston in the latter part of his journey, and could therefore recognise the great accuracy of his descriptions. There could be no question as to the great natural resources of Yezo. It produced gold, galena, iron-sand, iron-stone, and copper-ore. The great want was labour and roads. The Japanese lived in villages along the coast, and the interior was only known from the descriptions of the Ainos. He had travelled from Hakodadi to Mori, and thence along the shores as far as the mineral springs of Kokumi, and back again to Hakodadi. It was one of the most delightful journeys he had ever taken. He set out from Hakodadi about the middle of May, when the lily-of-the-valley was in a profusion of flower all along the isthmus which connected the rock of Hakodadi with the rest of the island. This rock was a species of Gibraltar, situated at a corner of the island. He then took a road through the woodlands to the lake under the volcano described by Captain Blakiston. This was the only part of the island in which he saw anything like regular farming. The forest trees were similar in kind to those of the southern parts of Scotland,—birch, ash, various descriptions of pines, and mountain-ash. There was also a most magnificent maple. From the lake he passed over to Mori, where he first saw the Ainos;

and certainly any one who once saw them would immediately perceive the great distinction between them and the Japanese. The Japanese were a mixed race of Mongolians, Chinese, and South Sea Islanders, and were a striking contrast to the Ainos, who had long hair, thick beard and mustachios, and clear, well-set eyes. From Mori he went to the other side of the volcano. At a particular part of the coast-line, the strata, formed by successive eruptions, were so distinctly marked, that it was almost possible to count the years which had elapsed between the eruptions, by the depth of the strata. About thirty-five years previous to his visit in 1864, a very copious eruption had taken place, and all the trees then in existence were burnt, the bark being stripped off, leaving nothing but white wood. Beneath these white sticks was the undergrowth from the young seeds. This afforded some data for determining the dates of the earlier eruptions. From the volcano he went to Kokumi, where a hot spring issued from the side of the mountain and fell into three basins. In the highest basin the water was so hot that it was impossible to bathe in it. Invalids who could not attend the public bath were allowed to take the water away to their own tents or huts. The second bath was reserved for patients of a better class, who paid a certain amount of subscription-money. The third basin was evidently devoted to the common people. It was then very early in the season, and there were only about 50 or 60 persons there; but he was told that in the height of the season 300 or 400 people resided there. From Kokumi he went back to Hakodadi by a different route from that which he had first travelled, over a high chain of mountains and through beautiful woods. Hakodadi was certainly not favoured during the winter in the matter of climate, for it was exposed to strong north-easterly winds, and to a strong icy current from the sea of Okhotsk. The summer, however, was very delightful.

Sir H. PARKES said it had been recently proved that the warm stream from the south flowed up the west side of the island, while the cold stream from the sea of Okhotsk came down on the east side. The consequence was, that the west side of the island enjoyed a favourable climate, while the cold and fog were chiefly confined to the east coast. As the west side was also the best and richest part, nothing was wanted but industry, enterprise, and population, to make the island of Yezo as prosperous as any other part of the Japanese empire.

Seventh Meeting, February 26th, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Harry Rivett Carnac, Esq.; F. L. Cook, Esq.; Charles R. Cope, Esq.; Hon. H. Crespigny-Vivian; Edward Dent, Esq.; Joseph Dixon, Esq.; Isaac Broad Eade, Esq.; Don Juan Espinosa* (Baron de Eldenburg); *William Feuner, Esq.; James King, Esq.; Captain J. Liebenrood*, R.N.; *Arthur Styan, Esq.*, F.S.A.; *Capt. Alex. Wood; Charles H. Westendarp; Lieut. William Thomas Wilson* (Beng. Eng.).

ACCESSIONS TO THE LIBRARY FROM FEBRUARY 12TH TO 26TH.—'Le Névé de Justedal et ses Glaciers.' Par C. De Seue. Christiania, 1870. 'Om Skuringsmœrker Glacialform,' &c. Af Theodor Kjerulf.

Christiania, 1871. 'Storm Atlas.' Af H. Mohn, 1870. 'Norskes Officiel Statistik for 1870.' From the Royal University, Norway. Portraits, framed, of Sir George T. Staunton and Dr. John Lee. Donor S. M. Drach, Esq. 'Antidote against Unscriptural &c., Geology.' By P. M'Farlane. Donor the author. 'Madras Road-Book.' Edition of 1839. Donor S. M. Drach, Esq.

ACCESSIONS TO THE MAP-ROOM, SINCE THE LAST MEETING OF FEBRUARY 12TH.—Geological Map of the Lower Geyser Basin (Firehole River), Wyoming Territory. By F. V. Hayden, Geologist. Presented by W. H. Jackson, Photographer U.S. Geological Survey.

LIVINGSTONE SEARCH AND RELIEF EXPEDITION.

THE CHAIRMAN announced that the Council had been informed by Messrs. Cousens and Co. that the steamer, *Abydos*, with the Relief Expedition on board, passed Malta on the 23rd, and was expected to reach Port Said on the evening of the 25th, and Suez the next night. She would then proceed direct to Zanzibar. All were well up to the last accounts. He was also glad to say that the finances of the undertaking were in a very satisfactory state. Many of the contributions that had been received showed how great was the interest taken in the Expedition, not only in this country, but in distant parts. His Excellency Count Platen, an honorary member of the Society, and formerly Swedish Minister to England, had sent 100*l.* from Stockholm, and the Royal Geographical Society of Italy had also contributed 15*l.* Committees had also been organized in Scotland and Ireland. From Glasgow a cheque for 1000*l.* had been received, and 400*l.* had been subscribed in Edinburgh, although, the list not being closed, the money had not yet been remitted to the Society. A subscription was also opened in Dublin. Exclusive of the Edinburgh subscriptions and the 600*l.* balance of the Government grant at Zanzibar, the Society had at present received 4242*l.*

During the meeting, the President received a telegram from the Rev. Horace Waller, which he read, to the effect that the sender had just received a letter from Dr. Kirk of so late a date as the 6th January, and that there had been received, up to then, no news of Dr. Livingstone, nor, indeed, from the interior. The Sultan of Zanzibar was going to Mecca.

MR. CLEMENTS MARKHAM, Secretary, read the following extract from the 'Sydney Herald,' relating to New Guinea:—

"The schooner *Surprise* has been absent from Sydney some eight months. On her departure from this port she proceeded to New Guinea, and from thence cruised among the Line Islands. She is last from the Loyalty Group,

whence she sailed on the 10th instant. Fresh and favourable winds prevailed until her arrival. The schooner *Surprise*, from New Guinea, has lately been employed by the London Missionary Society on the coast of New Guinea, where she has been most successful in placing missionary teachers and their families on the main and adjacent islands. Captain Paget informs us that at every place visited, instead of hostility and treachery being shown, as has generally been believed, they experienced nothing but the greatest kindness and hospitality, and all seemed highly pleased at having teachers placed amongst them, and it is evident they are very desirous of having intercourse with Europeans. At Redscar Bay, Captain Paget and his chief officer went about 15 miles up the Manoa River, where they had communication with several tribes, and were kindly treated by all; they seemed a perfectly harmless race of people, and not a single war instrument of any kind was seen amongst them. They were certainly of Malay origin, and it was quite evident that they had never seen white men before, as they gazed with wonder and astonishment at them, and would not believe they were human beings until they were convinced by thoroughly examining them: they also seemed most anxious to have further intercourse with them by inviting them to stay; and upon their departure they showed great sorrow,—the women and children crying and the men following them a long way down the river, waving green bushes and making them presents of sugar-cane, &c. That gold exists is quite certain, as one of the missionaries had an earthen cooking utensil made a present to him, in which several small specks of gold were distinctly seen. We understand Captain Paget and his chief officer intend shortly to settle on New Guinea. Had strong south-easterly weather first part of the passage, latter part, moderate north-easterly winds."

The above extract was accompanied by the following letter to Sir Charles Nicholson, Bart.:—

"DEAR SIR CHARLES, "279, George Street, Sydney, November 30, 1871.

"I beg to enclose herewith an extract from the 'Sydney Herald' respecting a late cruise on the coast of New Guinea made by the schooner *Surprise*, and proving beyond doubt that the island can be safely visited, and the fancied ferocity and implacable hostility of the natives merely imaginary.

"I have taken the liberty of troubling you, Sir Charles, on this matter, knowing so well how persistently you have advocated the opening up of this magnificent island to science, civilization, and commerce, and beg to remain

"Your obedient servant,

(Signed) "J. C. TUCKER.

"*Sir Charles Nicholson, Bart., London.*"

The following paper was then read by the author:—

The Recent Journey of the Archimandrite Palladius through Manchuria. Translated from the Russian, and adapted by E. DELMAR MORGAN, Esq., F.R.G.S.

My object in this paper is to give some details about an expedition organized by the Imperial Russian Geographical Society to explore Manchuria and the maritime province of the South Ussuri.

The route of this expedition diverged from that taken by Williamson (see 'Notes on Manchuria,' Journal Royal Geographical Society, vol. xxxix), at a point two stages north of Girin, where,

instead of following the road to Larin and Ashe-hoh, and thence to San-sing (Williamson's farthest), the Russians turned to the left, and continued their journey along the right bank of the Girin-ula, or Sungari River, to its confluence with the Nonny, a tributary of the Sungari (Ta-chuan, or Great River); and after crossing the two rivers, a short distance above their confluence, ascended the left bank of the Nonny, which Palladius considers is entitled to rank before the Girin-ula as the parent stream of the Sungari, as well on account of the greater volume of its waters as of the greater length of its course.

The Russians visited the city of Tsi-tsi-khar, near the confines of Eastern Mongolia; and leaving the Nonny at Mergen, crossed the branch of the Khin-an Mountains, which forms the watershed between the Upper Amur and the head-waters of its great tributary the Sungari; and, after crossing the Amur at Aikhun, arrived safely in Russian territory.

Their journey was therefore partly through a country which had not been visited by modern European travellers; through vast prairies teeming with vegetation, where, in the words of the Archimandrite, "Nature welcomes the traveller as a rare guest and surrounds him with her choicest gifts;" through dismal swamps and thick forests, infested by innumerable swarms of gadflies, which attacked man and beast with relentless fury.

The geographical results of the expedition are increased by a sketch-map of the route from Pekin to Aikhun, drawn by the Russian topographer who accompanied the expedition.

The diary of the Archimandrite Palladius records his impressions of the country and its inhabitants, and his knowledge of the languages of Eastern Asia has enabled him to throw the light of his erudition on monuments of dynasties and races of men who once played an important part in the world's history. Estimating the geographical results of the expedition, Veniukoff, the celebrated Asian traveller, says that the Russian route-map is the only topographical work since the time of the Jesuits, which includes both Southern and Northern Manchuria; and it not only adds to, but in some degree corrects, our knowledge of the high road from Pekin to Aikhun.

On comparing it with the Chinese atlas, it has been found to agree very nearly with the latter, with one marked exception, which occurs in the first section of the route between Pekin and Yung-ping-fu, where the direct distance on the Russian map between these two cities is 154 miles, while on the Chinese atlas it is only 127. So important a discrepancy must, in some measure,

be accounted for by supposing that in the earlier stages of the route the topographer had not become accustomed to the rate of progress of his caravan.

Between Shuan-yan and Mukden, the high road, according to the Chinese and the best European maps, including Williamson's, is directed upon the latter city from the west; while on the Russian map, for two stages, or about 37 miles before entering Mukden, the direction of the road is from the north-west. This alteration will remove the positions of Sing-ming-tun and the fortress of Tsiŭ-liù-ho more than 20 miles further to the north than at present marked on our maps, and will change the course of the Liau-ho River.

Finally, in the section of the route between Bo-du-na (Bedumeh) and Tsi-tsi-khar, no less than twenty-three lakes are marked on the Russian map, whereas the old maps have only seven or eight. This large number of lakes shows how level is the plain of the left bank of the Nonny, and also indicates the excessive moisture of that part of Manchuria, notwithstanding the prevalence of dry winds from the neighbouring country of Mongolia, whose course across the Khin-an Range is unimpeded by the comparatively low elevation of this range in the 46th degree of latitude.

The level nature of the plain implies a sluggish stream in the Nonny, and this, as a fact, is confirmed by the Archimandrite's diary, where he describes that river as forming great bays in which there is hardly any current; like most marshy rivers, its channel is beset by shallows. Turning from the geographical to the ethnological results of this expedition, we are reminded of the great change which has taken place in Manchuria under the influence of Chinese colonization. These immigrants are called Mantszi —a name which originated during the reign of Kublai, the "Great Khan" in Marco Polo's time, who despatched colonies of Mantsziun, or Chinese soldiers, to the borders of Corea to resist any invasions of the Japanese, which he apprehended would ensue after his unsuccessful expeditions to their country. The Mantszi, or Chinese immigrants, are chiefly from the provinces of Shan-tung, Shan-si, and Chi-li: they have nearly absorbed the native races of Manchuria. The Shan-tung provincials are the most numerous; they form the settled agricultural class of the population, and are skilled in the arts of husbandry; their dialect is prevalent throughout Manchuria, and their influence is so great, that their mode of living and their manners and customs have been adopted throughout the country.

The Shan-si provincials form the roving commercial class; they

are the bankers, merchants, tradesmen, and pawnbrokers. They are remarkable for their wonderful aptitude in acquiring languages. In all their dealings with the tribes of Manchuria, as with the Russians at Kiakhta, they speak the language of their customers, pronouncing the words with peculiar grimaces; the only language which they discard as useless to them in their business is the Manchù, which bids fair to become obsolete at no distant time. The government of these colonists is conducted by courts of the second class, presided over by Chinese magistrates, who are dispersed throughout all the chief towns of Manchuria.

The factious element of the population of southern and central Manchuria, but especially of the province of Girin, where they are most numerous, is composed of Mahommedans, who are hated and feared by the Chinese Government, and are treated by the officials with the utmost rigour. Bands of these Mahommedans infest the hilly country, plundering travellers and caravans for money and opium. They are called Ma-tzĕ or horse-robbers.

The Mahommedans in northern Manchuria are only permitted to live in the chief towns, where they are under the immediate control of the authorities. The province of Girin contains ruins of fortresses and towns, which are of the highest interest to the student of Chinese history.

Some of these ruins mark the period of the Ming dynasty in China, whose emperors were compelled to keep a large military force to hold in check the Mongols on the west and the Manchus or Churché on the east. Others relate back to an earlier period, namely, to the sovereignty of the Bo-hai princes, who were vassals of China in the early part of the eighth century, but shook off their allegiance and ruled Manchuria as independent princes for 200 years, during which period the Manchu nation took the name of Bo-hai. A few traces are visible of the empire of the Coreans, whose great empire in Manchuria was terminated after a bloody war with the same princes of Bo-hai. There are traces also of other tribes, but in some places only the name of a village or station remains to remind the traveller of a once powerful and warlike race.

As the travellers advanced into the valleys of the Chang-pŏ-shan, or Long White Mountains, the cradle of the Manchu race, they met with some splendid specimens of the original Manchu stock, who had preserved the best qualities of their race unimpaired, in the heart of the mountainous region. Judging from their appearance, it was difficult to trace their connexion with the people to whom the generic name of Tunguz has been given by Russian

ethnologists, and whose scattered and degraded offshoots inhabit the banks of the Amur and Ussuri.

The early history of the Manchu race is somewhat obscure, and the historical committee of Pekin has not thrown much light on it; but one marked feature in their earliest political organization deserves to be noticed, namely, the prevalence of the feudal system in their social relations. There were nobles and warriors on one side, serfs and liegemen on the other—all of one common origin; and this feudal system can be traced in Corea as far back as the first colonization of that country by tribes from the Chang-pŏ-shan Mountains.

These mountains have been held sacred in the far East for ages. Their actual name of Chang-pŏ-shan (Long White Mountains) was given them during the Kin or Golden dynasty, before which time they were known as the Great White Mountains, or simply Pŏ-shan or White Mountains, under which name they were known to the Coreans. All descriptions of this range—which has always been a favourite theme of Chinese poets—describe them to be void of arboreal vegetation, with flora mostly white, and with white fauna, which never injured, as they were uninjured by, man. During the Kin dynasty they were reputed to be the abode of the merciful white-robed deity, who is represented as a young woman with a child in her arms. The Coreans dedicated a temple to her, and the Corean Buddhists assigned these mountains as the abode of their miraculous deity.

All the poetical descriptions of this range refer to the chief group of peaks, and convey no accurate information as to the physical character of the range itself: indeed, the only reliable facts to be gathered from these writings are, that at a great elevation in the main group of the range, there is a lake with rocky sides which rise to a height of 2500 feet above its surface. Its dimensions are given differently by the several authors; according to one author it is 5 li broad by 8 in length. This lake probably occupies the crater of an extinct volcano.

I will now read you a few extracts from Palladius' journal:—

WALL OF CHINA, &c.

"On the 6th May the expedition passed the Great Wall of China at Shan-hai-Kwan (gate between the mountains and the sea), and entered the country of Kwan-tung, *i. e.*, country east of the gate (frontier).

"The wall in its present state was built during the Ming* dynasty; but traces of the earlier wall, built by the celebrated Tsin-Chi-Hwang-ti, are still visible on the hills.

* Ming dynasty, A.D. 1338–1644.

"Not far from the fortress the road passes over a hill, from the summit of which emigrants leaving China can obtain a farewell view of the barrier, and homeward-bound travellers first catch sight of their long desired native land: hence it bears two names, *Tsi-huan-ling*, hill of sorrow, and *Huan-hi-ling*, hill of joy. *Extract from Diary*:—'We now passed a hamlet, called Hung-tsiang-tszi (red wall), half a mile from which stands a solitary rocky cone, crowned with a temple dedicated to Siúi-ming-tsin, the renowned wife, commonly called *Tsin-nü miàu*, about whom there is a pretty legend. When Tsin-Chi-Hwang-ti drove 100,000 men to build the Great Wall, the husband of this woman was one of the number; time passed and no news were received of him, so at length she determined upon setting out alone and on foot to try and find him. Arrived at the sea-coast near this spot, she discovered that her husband had died at his work, and had been buried by his comrades at the foot of the Great Wall. Distracted with grief at the news, the poor widow sought out her husband's tomb, and, after bewailing his fate, dashed her head against the Great Wall. The stones were moved to compassion by her grief and devotion, and the wall fell and buried her upon her husband's tomb—this legend has formed the subject of several Chinese poems, holding up to universal execration the memory of Tsin-Chi-Hwang-ti. A stone statue of a weeping woman stands on ground commanding a view of the sea on one side, and the Great Wall on the other, and an inscription on the temple runs as follows:—"Where is the Emperor Tsin now? the Great Wall bears him everlasting hatred, though Tsin-nü is still remembered, and a stone will perpetuate the memory of her conjugal fidelity."'

"Upon entering Kwan-tung (country east of the frontier), the travellers were struck with the number of people they met on the road, some in carts, others riding horses, mules, or asses, but most of them on foot. They were, for the most part, traders and miners, natives of the province of Shansi, returning home from the gold-diggings (pao-di) in the East. They passed silently along the road, with grave, anxious faces, tanned by exposure to the weather and begrimed with dirt; parties of them were now and then seen resting under some tree, or partaking of a meal; there were women and children among them, and the same grave silence was observed during the halt as on the march, as if their thoughts were engrossed with their hard-earned store of wealth which they carried tightly bound up in their belts; there were poor ragged pedestrians among them, faint and weak from hunger, who could scarcely drag their weary limbs along. Occasionally a gaily dressed Mongol lama rode past, mounted on a handsome mule or horse, on his way to make a pilgrimage to the shrine of his saint at Vu-tai-shan."

Iwu Liui Mountains.

"The attention of the Russian traveller was now directed to a remarkable chain of hills, called the Shi-san-shan (13 hills), which are divided into 13 distinct peaks. These hills are of volcanic origin, the furthermost is rent asunder from top to bottom, and is said to contain a small lake; the direction of this remarkable chain of hills is north-east, on the south they are surrounded by a level plain—their sides are composed of rude masses of perpendicular rocks. In the distance looms the great mountain range of Kwang-ning-shan, of which these hills are a branch. The travellers were much impressed with the grandeur of the great range, which under the classical name of Iwu-Liùi, takes so prominent a place in Chinese History and superstitions. *Extract from Diary*, pp. 67-70:—

"'These mountains apparently consist of bare steep rocks piled one upon another, their name Kwang-ning-shan is derived from a town near them, they are also called Lŭ shan, or the six hills, owing to the six tiers or terraces

which mark their ascent from the plain, but their classical name is Iwu-liùi, a name not of Chinese origin; they are mentioned at a very remote period of Chinese history, when China first learnt to know the country north-east of her own territory. Iwu-liùi was for ages honoured as the guardian mountain (Chen shan) of the province of darkness, *i.e.*, Manchuria of the present day; and was named one of the 12 celebrated mountains which were appointed guardians of the 12 provinces of the Celestial Empire. All the dynasties of China, including the one now reigning, have paid homage and sacrificed offerings to this range. The Chinese believe that mountains in pressing upon the soil impart stability to the adjacent country, and assist the inhabitants to retain possession of it; hence the spirits of the mountains as ruling powers of the country, together with the spirits of the seas and rivers; and in Manchuria, the spirit of the thick forests, entitled by the Kins, "Prince of the beautiful shade" (Kin-yin-hoù), were ever venerated and worshipped; invaders before entering the enemy's country first made oblations and sacrifices to the genii of the mountains in order to propitiate them. The Manchus honour the Iwu-liùi as a pendant to the Chang-pŏ-shan, both which mountain ranges protect their empire in this country. Iwu-liùi is also an everlasting monument to the Prince of Kitan, Jen Khuan Wang, upon whose memory Chinese geographers and historians love to dwell. When the founder of the Kitan empire in China (Tai-tsu) put an end to the sovereignty of the Bo-khai in Manchuria, he made the conquered country a dependency or vassaldom of China, under the name of Tung-tan-go (Eastern Kitan), and appointed his son, Jen Khuan Wang, viceroy over it. This young prince was devoted to literature and science, he collected a great number of manuscripts and Chinese books, and built a library and study on the very highest peak of the Iwu-liùi Range. Here he passed his days in complete solitude with the single diversion of looking at the sea. Iwu-liùi also contains the burial-place of the Kitan Tai tsù. According to Chinese geographers this range is distinct from any other; it occupies an area 230 li in circumference, and is 130 li distant from the sea. Its formation is very different to that of the other mountains of Manchuria.'"

MUKDEN AND LIAU-TUNG.

"The country of the Liau-tung, or country east of the Liau-ho River, now entered by the travellers, excited their warmest admiration. The land is well cultivated and the inhabitants prosperous. The level plain is varied with plantations of willow-trees and poplars, now marking the boundaries of fields and homesteads, now casting a welcome shade over some burial-place, now clustered in groves round a temple, and frequently planted in splendid avenues along the imperial highway to Mukden.

"This city, like Pekin, is situated in a level clayey plain, intersected by ravines. Its streets are laid out at regular intervals, and are cleaner and better paved than those of Pekin. Its trade is very considerable, as it is the focus to which the trade-routes from the Port of Newchwang from China Proper, Corea, Inner Manchuria (*i.e.* province of Girin), and Eastern Mongolia converge. Among the special objects offered for sale at the shops may be noticed furs (though the best sables from the district of the Goldi are now taken to Russia), jin-sing, and articles in nephrite. The fuel used at Mukden is an inferior kind of mineral coal, quarried in the Ben-si-Khu Mountains to the south-east of the city—a tributary of the Liau-ho flows on its south side.

"Mukden, otherwise called Shing-King or the Flourishing Capital, was built about the year 1630, by the second Khan of the Manchu dynasty. To the west of the city is a splended lama temple, containing one of the most celebrated of the Buddhist idols—called the 'Defender of the Faith,' and appointed the guardian Divinity of the city.

"The cities of Mukden and Hing-King are regarded as sacred, owing to the tombs of the ancestors of the present dynasty being situated near them. Till the beginning of the present century the Bogdo-Khans considered it their sacred duty to visit at least once during their lives the tombs of their ancestors; but since the reign of Kia King, these visits have been discontinued. A circumstance which may account for the neglected state of the roads and bridges, which have been allowed to fall into decay, the ditches on either side of the road being choked up with grass and weeds, and the trees cut down or otherwise destroyed."

SUPERSTITIONS.

"Among the curious superstitions of the Chinese in Manchuria the following are interesting:—Upon the removal of the dead bodies of Chinese emigrants to their native country, it is customary to obtain a supply of tickets from the temple dedicated to the guardian divinity of the place of residence of the deceased. One of these tickets is burnt upon the crossing of each river or pass, in order to propitiate the good genius, and to secure a free passage for the spirit of the deceased, which they believe follows the body.

"On the 13th day of the 5th moon a great holiday, called Mo-dao, or sharpening of the sword, is celebrated. This day is devoted to sacrificial offerings to the deity Kwan-ti, who is said to sharpen his sword, whence the Chinese attribute the portents in the heavens, such as thunder, lightning, and rain. Chinese officials believe that the season is favourable for propitiating the deity, in order to obtain advancement in rank.

"The invariable and most prominent images in every house are those of Laoe and Tsai-shen, the gods of wealth; but another image frequently met with in Northern Manchuria is that of Cheu-sian-laoe, who is depicted as a Chinese gentleman, elegantly dressed, drawing the crossbow at the constellation of the Black Dog, which is considered hurtful to children, upon whom it brings maladies of all kinds. Cheu-sian-laoe is worshipped as the guardian spirit of children, and his shrine is found in all the dwellings of the district. The shamanka, or sorceress, is supposed to possess the power of exorcising this evil spirit, which is visible to her alone.

"Swallows are respected by the people. They build their nests inside the houses, and may be seen flying in and out of the windows with perfect impunity at all hours of the day."

TSITSIKHAR.

"Tsitsikhar is the chief penal settlement for the worst kind of criminals. Its Mahommedan population is large, and divided into two distinct classes, occupying separate quarters of the city, and called respectively Tung-hwui and Si-hwui—eastern and western. They have their separate mosques, and hold no intercourse with each other. The former are settlers from China, and are notorious for their bad character; the latter are exiles, and are well behaved. Acts of robbery and violence are of frequent occurrence at Tsi-tsi-khar, and the governor patrols the streets at night to keep order. The duties of the governor of Tsi-tsi-khar are of an onerous nature. He has to manage the But-khans, who are the professed trappers and hunters of the different tribes inhabiting Northern Manchuria; attend to the frontier relations with Russia, and guard the convicts, who give him a great deal of trouble. They include pirates, insurgents, members of dangerous religious sects and secret political societies, the most desperate robbers and abandoned villains, forgers, appropriators of government moneys, illegitimate relatives of the Bogdo Khan and court attendants. They number upwards of 3000 in Tsitsikhar, where the only control exercised over them is to count them once a month. They are

neither confined in dungeons nor guarded by soldiers. The severity of the sentence is proportioned to the nature of the offence; some families are banished for four or five generations; the severest sentence is banishment for a long term, or for ever, coupled with servitude to the Solono and Dahur cavalry soldiers in the government service.

"The total military force available in case of unforeseen disturbances can be estimated at 30,000 families, exclusive of the But-khans; besides which, the governor of Tsitsikhar may requisition troops from the province of Girin in case of necessity. Direct communications with Pekin are kept up by couriers mounted on relays of fleet horses, stationed along the road through Mongolia *viâ* Si-fin-kou. A courier from Tsitsikhar can deliver despatches at the court of Pekin in three or four days. This service is admirably organized; the horsemen employed in bearing these despatches ride at full speed over any roads and in any weather, and frequently dispense with a saddle.

"One of the most interesting features of the life at Tsitsikhar is the annual gathering (Tchulkhan) of the But-khans in June and July. They are accompanied by their Ukhorida, or government commissioner, and encamp outside the town. The tribute of 5500 sable-skins is first levied, after which the governor presents them with money, corn, and clothing. When these ceremonies are terminated, a great fair is held, at which furs and cattle are bartered and sold. The Chinese merchants take an important share in these fairs."

I will conclude these few extracts with a sketch of a Mongol peasant girl, who overtook our travellers on the road to Tsi-tsi-khar:—"She was mounted on a fleet steed; her dress, a blue wide-sleeved tunic, was gathered round the waist with a belt; her hair was confined in a kind of helmet, over which was fastened a piece of white cloth, which fluttered in the wind. Her bold fearless eyes peered into each of the carts as she galloped past." The character of the scenery beyond Tsi-tsi-khar is that of a boundless rolling plain, the depressions in which are frequently filled in with lakes. Military settlements of the Solones and Da-hurs are sparsely scattered over the great plain.

A feeling of desolation would oppress the travellers as they continued their journey along the swampy basin of the Nonny amid this universal stillness, which contrasted so forcibly with the busy, stirring life of the cities and towns they had passed, and their thoughts would again and again recur to the bustling life on the great highway of Manchuria to the upper Sungari and the lower Nonny, to the fine meadow lands, the rich fields, and the populous and animated towns and villages which they had left behind them, to those plains which, from the earliest period, served as exercising grounds, on which the semi-barbarous tribes from the woods and mountains of northern Manchuria acquired the rudiments of settled life and political organization under the auspices of China and Corea.

Time will not permit me to give you further details of Palladius' journey, much as I should wish to follow him down the Amur and up the Ussuri and Sungatch, across Lake Hinka to Nikolsk, where

he spent the autumn and winter of 1870, exploring the ruins for which that district is famous, and studying the ethnology of the tribes in the maritime province of Manchuria.

The few extracts I have given you will, I hope, convey an idea of the important results to be derived from this expedition, and of the scientific interest which these remote regions of Eastern Asia must possess for every educated Englishman; however cordially, from another point of view, he may be disposed to sympathize with the exclamation of the poet—

> "Better fifty years of Europe,
> Than a cycle of Cathay."

Sir RUTHERFORD ALCOCK said he was personally acquainted with the Archimandrite Palladius, and knew him to be a man of great integrity and acquirements. He was thoroughly acquainted with the Chinese language, and his observations might be fully relied on. Manchuria was the cradle of the present dynasty of China. The Manchus conquered China with their own good swords, and contested the superiority for some time with the Mongols. For the last two or three hundred years they had retained possession of China. There were many points of interest connected with this people. The frugality, the temperance, and the bold courage of the nomad race, enabled them to overrun the whole of China; but, during the progress of years, the superior intelligence and civilization of the Chinese had completely redressed the balance, the nomad races conquering in their turn. The present dynasty was nominally a Tartar one; but the Manchu language had almost disappeared. Not long ago an edict was issued compelling the Manchu nobles to learn Manchu, in order that the language might not be lost. The Chinese had swarmed into Manchuria, and taken entire possession of the trade. The geographical expeditions of Russia were very interesting, but they had a political significance also which the Chinese very well understood. The Russians were the only map-makers in those regions, and the consequence was, that whenever the frontiers were rectified theirs were the only maps to be relied on, and the Chinese did not always get the best of the bargain. The last rectification of frontier was during our late war with China, when one-half of Manchuria was surrendered by the reigning family. The country was very sparsely populated compared with China, and vast regions were but little cultivated. Mr. Meadows, late Consul there, often made expeditions far into the interior, and his reports were full of interesting details. He showed that, notwithstanding the superiority of the Chinese civilization, the Manchu race still retained a good deal of their primitive simplicity—their frugality and husbandry. The Chinese took all the trade from them, managed all their commercial transactions and banking, and did not forget the profits. The vast plains of Manchuria produced very little, however, that could be exported, except pulse, beans, and bean-cakes. It was believed that there were very valuable seams of coal there, but there was no skill to work it, and the Chinese Government was very jealous of the employment of foreigners. Opium, latterly, had been largely cultivated, and was able now to compete with the Indian product. Very considerable quantities of English cottons and woollens were imported, and the trade was steadily increasing. At present the trade of the southern part of the country amounted to upwards of 2,000,000*l*. If the soil were better cultivated and the mines were worked, this trade would be largely increased, for the wants of the people would grow in proportion to their means of supplying and paying for them.

Sir HARRY PARKES said since he left China, Mr. Meadows and Mr. Williamson (a missionary of the London Missionary Society) had given exceedingly good accounts of Manchuria as far as the southern portion was concerned; but the results of the Archimandrite's journey would be of particular value with regard to the most northern province. The country was divided into three provinces —the southern, the central, and the northern. The southern province had an area of 90,000 square miles, the central 135,000 square miles, and the northern 165,000 square miles—a total of 400,000 square miles, or an area double that of France. The population numbered about 15,000,000, of which 11,000,000 or 12,000,000 were Chinese. When Manchuria entered upon its war with China its population was probably not above 3,000,000 or 4,000,000. The war was of long continuance, and when it was concluded nearly the whole population was drawn off into China, leaving Manchuria nearly vacant. Then followed the process of absorption described by Sir Rutherford Alcock. These 3,000,000 or 4,000,000 were distributed about in the metropolitan cities, virtually as permanent military garrisons, and ultimately became absorbed into the great mass of the Chinese, losing even their language as well as their peculiar ceremonials and customs. On the other hand, the Chinese emigrated to Manchuria and took possession of the vacated land. The old European name of China—Cathay—was a corruption of the Manchurian word Kitau, sometimes written *Khitai*. The country was also interesting to archæologists, because on the borders of Korea there were remains of considerable cities. The only port was New Chang, at the head of the Gulf of Liau-tung, and although the existing trade was not very large, there was promise of considerable extension. The trade at present amounted to about 3,000,000*l*., and the consumption of English manufactures reached 1,000,000*l*. a year. With an increased population this would remarkably increase; and the wonder was, considering the crowded state of the adjoining Chinese provinces, that the Chinese portion of the inhabitants did not number 40,000,000 instead of 10,000,000 or 11,000,000. If the Government had any life at all in it, and wished to promote industry, they would have assisted emigration to Manchuria; but they had not done so, and the consequence was that emigration had found an outlet in the south of China towards the Indian Archipelago, Australia, and America. What Manchuria needed was population. Mr. Meadows described it as being utterly destitute of roads. The rivers were not favourable to navigation, and all the products had, therefore, to be taken to the coast in carts. This could not be done in summer, in consequence of the soft state of the ground, and the carrying season was, therefore, during a hundred days of winter, when the whole country was frozen and hard. During this season Mr. Meadows estimated that 60,000 carts, dragged by 300,000 bullocks, and attended by 130,000 men, came to New Chang. This showed what might be expected if good roads were made and tramways laid down. China, by its want of knowledge of geography and its general inertness, had lost first one grand river, the Amur, and then the Ussuri. The third great river of that region—the Sungari—had been navigated by the Russians as far as Girin. If the Chinese did not take care, they might, by-and-by, have to record the loss of that river also. Korea had lately acquired prominence from the French, and, more recently, the American expedition. It might be concluded that, sooner or later, communications with that country would be established, and then a very interesting field of enquiry would be opened out to the student of the subjects treated of by the Archimandrite Palladius.

Mr. LOCKHART said that on one occasion, when returning from one of his adventurous journeys, Mr. Meadows met with a severe accident which utterly prostrated him, and he (Mr. Lockhart) went a long journey in a cart, in the depth of winter, and brought him safely to Tientsin. He was glad to have the opportunity of paying a tribute of respect to the memory of the late

Thomas Taylor Meadows, who did so much for the elucidation of the Chinese mode of government. Palladius appeared to have paid but little attention to the coal districts he passed through, but there could be no doubt that a great amount of coal was found in all that part of the country through which he had travelled; and at the present time, when so many steamers went to China, it was of extreme importance to be able to obtain a cheap supply of coal somewhere in the neighbourhood. In Japan steam machinery was already at work in getting coal, and it would be a good day for China when she willingly and freely admitted steam machinery. The Russians had not yet so "rectified" their frontier as to take in this coal district of Manchuria, otherwise we should have learnt more about it. At the Lake of Hinka a great quantity of gold was brought down by the rivers, and also at Cape Nicolaif. When, during the Russian war, our soldiers landed on the coast, the inhabitants brought pieces of gold in exchange for empty bottles. The Russians were at present getting their full share of the gold. They had also obtained the island of Saghalien, and were creeping towards the northern part of the island of Yezo, and probably before long the Japanese would have to contest the possession of that island with them. In the middle of the last century the fort at Albazin on the Amur was garrisoned by some 300 or 400 Russian troops. The Chinese, passing over Mongolia, attacked this fort, and at last starved the garrison into surrender. The captives, to the number of 200, were taken to Peking, where a portion of the city was set apart for them on the northern side, and their descendants remained there to the present day. The Russian Government thereupon petitioned the Chinese Government for permission to send some priests of the Greek faith to teach them, and to keep them well informed in the principles of their religion. This request was granted, and Russian priests were sent to Peking. This was the commencement of the Russian ecclesiastical mission in Peking. Eventually this mission became of so much importance that an archimandrite was appointed superintendent, and various archimandrites of great ability had had charge of the mission. It was not a pleasant position for a dignitary of the Greek Church to be placed in; but the Russian Government, with great wisdom, had always sent men of very superior intelligence and high education to superintend the mission. Palladius had won for himself great renown, not only for his travels, but for his knowledge of Chinese. The name of another archimandrite, Hyacinth, was honoured and respected by every student of Chinese. During the Kin dynasty, about A.D. 1120, the Manchus endeavoured to get for themselves a written language, having prior to that time no means of expressing the sounds of their language in written characters. They at first adopted a complex adaptation of the Chinese characters called New-chih. This method lasted about four centuries, and then died out. Almost the only existing remains of this character are found on a large triumphal arch erected in the midst of the wall of China on the great high road between China and Mongolia. The arch was built of marble, to commemorate the victories of the Mongols over the Chinese, and on the sides is an invocation to Buddha, written in six languages, one of which was this ancient language of Manchuria. There was also a small inscription in the same character in the court of a temple in Peking. The Mongols also attempted an experiment in the same direction about 600 years ago, but they adopted the Bashpah character. This, however, was found so cumbersome that after the time of Kublai Khan they adopted the Anigour character, in which Mongolian has been written ever since. The Manchus, then, finding that the Mongols had a character more easily written than their own complex Chinese characters, adopted the Mongol Anigour characters. It was curious that these two northern tribes should have made such an experiment, especially when it was remembered that they were by no

means literary nations. From what he had seen, he considered the Mongols a much more interesting race than the Manchus. The Mongols were a tall, stalwart, noble set of men. Every year great numbers of them came down to Peking with cattle and frozen game, which they exchanged for the silks and satins of China. He was always charmed with their pleasant, outspoken manner, and they always showed a desire to have intercommunication with Europeans. The Manchus, on the other hand, were a smaller race. Of the three northern races that were in the habit of visiting Peking, the Mongols were the pleasantest. The Koreans, a small, stunted, quarrelsome race of men, were always kept at a distance by the Europeans.

The PRESIDENT said it was quite true that the Mongols adopted the Bashpah alphabet and the Manchus the New-chih, but they both had the original Nestorian alphabet long before. As a proof of this, there were letters in the Imperial Library at Paris, which were sent to the King of France, in the Mongolian Nestorian character. The Bashpah character, an adaptation of Thibetan, was invented in the year 1256.

Mr. LOCKHART said he had intended to mention that date.

The PRESIDENT said there were specimens both of the Bashpah and the New-chih on the Keuyung arch. In the edition of 'Marco Polo,' lately published by Colonel Yule, there were facsimiles of Mr. Wylie's rubbings, giving specimens of these characters. There were three great divisions of the nations of High Asia, independently of the Chinese: the Turks, the Mongols, the Manchus, all to a certain degree cognate. Prichard considered them branches of the same family, but they were very distinct one from the other, and each had numerous subdivisions. The Turks extended from Kashgaria to Constantinople; the Mongols were to the east of these, and the Manchus occupied the most eastern portion of the zone. The subdivisions of these races were very curious, and required a great deal of elaboration, and he believed it was one of the most valuable subjects of research to which the studies of the Archimandrite Palladius had been directed. Mr. Morgan thought the subject too abstruse for reading, but the Archimandrite had made a considerable number of notes upon that subject. Father Hyacinth was, up to a certain time, our only authority on ancient Mongolian and Manchu antiquities; and his records, which had appeared in the St. Petersburg magazines, were of the utmost value. The original Russian port, at the mouth of the Amur, was found to be impracticable from being shut up so many months in the year by the ice. Since then the Russians had come down more to the south, and their favourite point was in Victoria Bay, from which the communication with the Lake of Hinka was easy, and from the lake to the Amur through the Ussuri River, so that by bridging over the short interval across the watershed they would obtain an exit from the Amur in almost a southern latitude. This might hereafter have a very great influence upon the development of trade. So long as their only exit from the Amur was by the mouth, it would be shut up many months in the year; but if the Ussuri became navigable, and then tramroads or railroads were laid down from the lake to the coast, there would be a practicable entry into Manchuria at all times.

Mr. FRERE said he had stayed for some time with Mr. Meadows at New Chang. The features of the country around New Chang were the same as in the deltas of almost all rivers—deep mud, and beyond that very fertile plains. There were also some large towns; but, unfortunately, some of them had recently been destroyed. The unsettled state of the country did not prevent travel, but when a strong Government was established there it would prove to be a magnificent country for agriculture and pastoral labours.

Sir H. PARKES said the present written Manchu language had a date of not more than two centuries and a half—not further back than 1600, or thereabouts.

The PRESIDENT said he had always considered the Manchurian writing in the same category as the Mongolian. They were very similar, being both modifications of the old Anigour, and the Mongolian dated from the time of the Yuen dynasty.

Note by Mr. Lockhart.—Gengis Khan, 1200-1250 A.D., took prisoner an Anigour, and commissioned him to instruct the princes in the use of the Anigour character. The Mongols had previously no written language. Kublai Khan, 1260 to 1280 A.D., employed a Lama on the same subject, but he died before he had completed the work. He was succeeded by Bashpah, a Thibetan, who invented the Thibetan form of character which goes by his name. This was used officially for some time, but gave place to a modified form of the Anigour adapted to express Mongol words, which is still in use. The Manchus invented the New-chih about 1120 A.D.; and in 1600, finding it ill adapted to convey Manchu words and sounds, the first Manchu Emperor employed a Mongol to invent a character; and he also used the Anigour, altered and adapted to the exigencies of the Manchu language. Thus both Mongols and Manchus derive their written characters from Anigour-Syriac.

Eighth Meeting, 11th March, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Abraham Scott, Esq.; Lieutenant W. de W. Abney; Frederick Leigh Hutchins, Esq.; C. H. Westendarp, Esq.; Edward Dent, Esq.; W. F. A. Archibald, Esq.*

ELECTIONS.—*William Bousfield, Esq.; William Wilberforce Baynes, Esq.; Donald Cruikshank, Esq.; Edward Ross Divett, Esq.; Aug. Daniel Friedrichsen, Esq.; George Gregson, Esq.; Lieutenant John Jones, R.N.; Captain Samuel Barrett Miles* (Bombay Staff Corps).

ACCESSIONS TO THE LIBRARY FROM 26TH FEBRUARY TO MARCH 11TH.—'Vindiciæ Sinicæ Novæ,' No. I. Par J. P. Abel-Remusat. Paris, 1872. 'Voyage en Provence, 1798.' 'Viaggio da Napoli alle Forche Caudine del D. Bartolini.' Napoli, 1827. 'Wegweiser in der Stadt Salzburg,' 1830. 'A Brage-beaker with the Swedes.' By W. B. Jerrold. 1852. 'Voyage en Italie de l'Abbé Barthélemy.' Paris, 1801. Adolphe Joanne's Guide Books:—'Bordeaux à Toulouse;' 'De Nantes à Brest, à Saint-Nazaire,' etc.; 'De Rennes à Brest et à Saint-Malo;' 'De Paris à Genève;' 'De Lyon à la Méditerranée;' 'Guide aux Eaux thermales du Monte-Dore, Vichy et ses Environs;' 'De Paris à Strasbourg.' Donor, S. M. Drach, Esq. 'Geological and Mineral Resources of Prince Edward's Island.' By J. W. Dawson and B. J. Harrington. Montreal, 1871. Donor Governor Robinson. 'The Dolmen Mounds of Brittany.' By S. P. Oliver. 1872. Donor the author. Annual Donation of Publications issued by the French *Dépôt des Cartes et Plans de la Marine.* Paris, 1871-72.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING OF 26TH FEBRUARY.—A map of West-Equatorial Africa near the Gaboon River, showing the explorations of Du Chaillu, Genoyer, Walker, and Aymes, &c. Presented by Dr. A. Petermann. Charts of the British Admiralty, on 17 sheets. Presented by the Admiralty, through Admiral G. H. Richards, C.B. 738 sheets of the Ordnance Survey: consisting of County Maps, Parishes, and Towns, on various scales. Presented by the Right Hon. A. S. Ayrton, M.P., First Commissioner of Works; through General Sir H. James, R.E., Director of the Ordnance Survey. Charts of the French Government, on 160 sheets. Presented by the *Dépôt des Cartes et Plans de la Marine*. Paris.

EXHIBITIONS.—*Cape Diamonds.*—An exceedingly lustrous Brilliant (of distinct yellow tint). A Diamond embedded in limestone as found; an interesting cabinet specimen. Exhibited by Professor J. Tennant, F.R.G.S.

The PRESIDENT, in addressing the meeting, said the papers to be read that evening referred to Beloochistan, and a portion of Persia. This region was of considerable interest on several accounts. Recently a line of telegraph had been laid along the entire length of the coast country from east to west, and many of the messages between England and India were transmitted by way of that line. This region, too, formed the boundary between Persia and the friendly state of Kelat, and everything affecting Kelat was a matter of interest to this country. The first paper to be read was by Major Ross, Political Agent at Gwadur, who on several occasions had visited the interior for the purpose of entering into friendly relations with the chiefs, with a view to the establishment of the telegraph. Recently, in connection with the determination of the frontier of Persia, it was found necessary that an officer should proceed from the sea-coast to the northward and make a reconnaissance survey of the country as a basis for the line of delimitation. The officer selected for that purpose was Lieut. Lovett, of the Royal Engineers, who at the time was under the orders of General Goldsmid, and this survey formed the subject of the second Paper. Last summer Lieut. Lovett performed the journey from the coast as far north as Kohek, and we had now the result of his survey. The accurate determination of the frontier was considered of such great political importance that General Goldsmid had been decorated with the Star of India as a reward for his labours. He was now engaged in a still more important work, viz. defining the boundary between Persia and Afghanistan upon the Lake of Seistan. Most of the troubles between Oriental states arose from violations of territory, and it was therefore of the utmost importance to fix accurately the line of frontier. Since the delimitation had been laid down in the southern part of the country a much greater degree of tranquillity had prevailed there, and it was to be hoped that a similar result would follow the continuation of a fixed boundary line to the northward. This was one among the many advantages to be derived from geographical labours such as these encouraged by the Society, which was not merely a speculative or dilettante body, but one that aimed at practical results and the advancement of the national interests.

The following Papers were then read:—

1. *Report on a Journey through Mekran.* By MAJOR C. C. ROSS.

[An abstract of this Paper was published in the 'Proceedings' of the Society, Vol. XVI., No. 2.]

2. *Survey of the Perso-Kelat Frontier.* By MAJOR B. LOVETT.

The PRESIDENT said that prior to the commencement of the present century Beloochistan was almost unknown to Europe. At the time when Sir John Malcolm went to Persia to oppose the French influence, which was then dominant at the court of the Shah, he thought it of great importance to gain some knowledge of this country, and he accordingly nominated three officers to traverse the province in different directions. Captain Christie proceeded as far north as Seistan, and then crossed the desert to Yezd and Ispahan; Colonel Pottinger went to Kelat, and thence right through the heart of Beloochistan to Kerman and Shiráz; Captain Grant from Gwadur followed a line parallel to the coast until he came out at Minab. These officers, however, did not remain long enough to gain any intimate acquaintance with the country or to ascertain its physical characteristics. The remarkable depression between two parallel ranges of hills which extends for a distance of 300 or 400 miles did not seem to have attracted their attention, though there is reason to believe that it was through that particular valley that Alexander passed when he led his army on his return expedition from the banks of the Indus to the Persian Gulf. It was certainly along the same line that the Arab army passed to the invasion of Scinde; for many of the stages could be identified, bearing nearly the same names now that they did 1200 years ago, at the time of the Arab conquest. In the recent discussions on the proposed through-line of railway to India, this valley had been frequently alluded to as a sort of natural bed for a railway. It was said, indeed, that for 300 or 400 miles it was possible to pass between two parallel lines of hills without crossing a greater elevation than 100 feet. The region at present bears the name of Mekran. For a long time this name was supposed by fanciful etymologists to be a contraction of two words *Mahi-khorán*, an exact translation of the Greek *Ichthyophagi*, "the fish-eaters": but this explanation would hardly hold water, for, in the first place, the words were modern Persian, and certainly was not the Persian spoken in the time of Alexander; and, in the second place, the cuneiform inscriptions showed that the country was at that time inhabited by a tribe called Maka, from whom, no doubt, the name of Mekran was derived. It was also called Gedrosis, which word was rather a puzzle to etymologists. The ethnology, however, was the most interesting question, because the country was inhabited by a tribe which was the only Turanian remnant to be found between Central Asia and the Mediterranean. The Brahoois were not Aryans although they were mixed up with the Belooches. The two names Brahooi and Belooch merely meant a "highlander" and a "lowlander." It was quite certain that Persia and Western Asia were inhabited by Turanian races before either the Aryans or Semites came in, and the Brahoois were a remnant of the old primitive Turanians. The Arabs, it was true, considered the "Kútch and Belooch" to be Arabs, but there was not a trace of Arabic in their language or manners; and although a few Arab colonies might have settled on the coast, the Belooches could not be considered in any way of Arab descent. That the Arabs passed along the great valley to the invasion of Scinde was proved by the fact that they were said to have débouched at the end of their march on the great town of *Armail* or *Arman-abíleh*, which was represented by the modern Beila. *Abíleh* merely meant the "Shepherds," and was applied to all the tribes inhabiting the range running from Karachi to the Gundava Pass.

Colonel MALCOLM GREEN said his experience as Political Agent was princi-

pally confined to the northern and eastern frontier of Beloochistan, his duties being much localised at the capital, Khelat. He had visited parts of Mekran to the south-west of Khelat in the direction of Kedj and Punjgoor, but had little time to examine that portion of the country.

With regard to the geographical features of Beloochistan, he was struck with the fact that, whilst all the main ranges (limestone) of mountains extending in longitude from the plains of Cutchee on the east to Kharan on the west, had for more than a hundred and fifty miles of their length a strike from N.N.E. to S.S.W., they appeared suddenly to change this direction, as they approached the coast of Mekran, to one nearly east and west, as shown in the map accompanying Major Ross's Report of his Journey from Gwadur to Kurrachee. He, Colonel Green, was curious to know where this change of strike commenced, as he must at times have been within 20 miles north of Major Ross's route, but found the ranges there still striking N.N.E. to S.S.W.

Sir BARTLE FRERE said Major Ross was one of the few survivors of the *St. Abbs*, the vessel that was wrecked many years ago upon the Somali coast, and regarding the fate of whose companions the Society had had a great amount of correspondence with persons on the eastern coast of Africa. Cadet (now Major) Ross escaped from the wreck on a raft; but it appeared certain that from that day to within the last few years some survivors of the ship, who were on another raft, had continued to live among the tribes on the eastern coast of Africa. Mekran appeared to be a country the surface of which had been wrinkled by some subterranean agency, and in which there was a curious difference between the courses of some of the great rivers and the lines of the mountains. In general, mountain-ridges and river-valleys ran in a somewhat parallel direction; but this was only partially the case in Mekran and Western Scinde, where the rivers, after running a certain distance parallel to the mountain-chains, often burst through them at right angles. In countries like Europe a general idea of the directions of the rivers conveyed, as a rule, a fair notion of the direction of the mountains, but this would not hold good in the country between Persia and the Indus. In the region between the Bosphorus and the confines of India the physical features were generally favourable for the construction of a railway as far as the frontier of Persia; but between Persia and Kelat there was a great back-bone of very old rocks, and on either side a series of longitudinal valleys and ranges of hills, one or other of which must be the route for a railway to India, if one was ever formed. It was a great puzzle to many persons, who attempted to trace out the features of the country, to find that the towns seemed to move about in the most provoking manner. This arose from the fact that a chief will burn the brush-wood huts of which his capital is composed, and move some distance off, on the breaking out of small-pox or the death of some of his children or cattle; so that unless there was some feature, such as a rock, on which his fortress was placed, to fix the position of the town, it might be moved about in a circuit of perhaps 8 or 10 miles. Curiously enough, though the date-palm was common on the coast, in the interior it seemed confined to certain lines of country; and the local tradition was that these date-groves grew up from the date-stones dropped by Alexander's soldiers on their return from the Indus. Along the coast was the region of mud-volcanoes, one of the places of pilgrimage for Hindoo devotees. These cones were apparently the remains of volcanic action, which probably existed in former times. They had a practical interest at the present time, because at one or two places there was evidently some volcanic action still going on under the sea, which threatened occasionally to interfere with the electric cables laid down. The coast was inhabited by people who had similar habits to those described by Nearchus, living almost entirely upon fish. Their

fowls, and what few cattle they had, also lived a great deal upon fish, and the eggs had an extremely fishy taste. Some of the people hardly knew what it was to see anything like wheaten bread. They pounded up a berry, much resembling the hip of the black-thorn, and not much more palatable; they mixed the mashed berries with curds, and this formed the vegetable staple of their diet. The coast of Mekran seemed to be a favourite resort for sharks. In a case of sharks' jaws unpacked at the British Museum some time ago, out of ten species, eight were new to the officials; fishes of the shark and allied tribes formed a part of the food of the people along this coast, who were clearly the lineal descendants of the Ichthyophagi of Alexander's time.

Mr. SAUNDERS said that Mekran might be considered as forming a series of small coastal river-basins, bounded on the west by the great continental basin of the Tigris and Euphrates, and on the east by that of the Indus. On the north they were bounded by a region drained entirely into sands or inland seas and lakes. The great Kej Valley was a feature well deserving of attention, running as it did for a distance of 250 miles, and drained by numerous rivers, having distinct outlets into the sea, with branches flowing now from east to west, again from west to east in the same right line, and where they met diverging at right angles to force their way through the mountains into the next lower valley, and so passing along in a zigzag course from terrace to terrace, till they reached the sea. Along this line may have been the route of Alexander the Great on the return of his army; but this point could not be conveniently discussed at present, because no sufficient information had been obtained with regard to the nature of the valleys to the northward. Colonel Malcolm Green had fairly identified and localised the Gedrosia of antiquity, which geographers had been pleased to apply to Beloochistan generally. He had shown that the designation should be confined to a valley south of Kelat, which to this day bore the name of Gressia, and near which were the remains of what was once a very large city, of which we had at present no account whatever.

Mr. PALGRAVE said he had travelled along the entire coast from Beloochistan to the head of the Persian Gulf, and found it closely resembling in character that of the Mekran. There was the same formation of low hills running in ridges parallel to the coast, and also the same feature, which was not peculiar to this district alone, of the occasional interruption of the ridges by water-courses, which found their way through them to the sea. The inhabitants also were pretty much the same. They might very properly be described as Ichthyophagi,—sharks, in particular, forming a principal though not very palatable article of their food; the mackerel were the finest in the world. The ordinary food, however, was a kind of small anchovy, which they beat up into a paste with any kind of grain they could find. If the proposed railway scheme was carried out, the line must necessarily follow the valley by which the Arab conquerors invaded Scinde and the north of India.

The PRESIDENT said the mountains of Mekran were a mere link in the great chain which stretched from the Bosphorus to China. In Asia Minor the chain bore the name of Taurus; hence it inclined south-easterly towards the vicinity of the Persian Gulf. Probably that section had the highest peaks. From this point it turned easterly, gradually lowering in height, till on reaching Mekran the peaks did not attain an altitude exceeding 5000 or 6000 feet. From Beila it turned again in a straight line to the N.N.E., and continued with slight variations in that direction by the Gandava and Bolan passes to the White Mountains of Jellalabad, and then merged in the Great Indian Caucasus. Mekran might also be called the home of the gipsies, for it was there they first settled after leaving the Indus. At the time of the Arab conquest the country was mainly inhabited by the Zats, who were brought, it was said, by King Bahram in the fifth century from the shores of

the Indus, and who were, in fact, the progenitors of the European gipsies; and it was remarkable that there was no other country in Asia the inhabitants of which retained so much of the gipsy character as Beloochistan. There was hardly, indeed, a village or encampment in the eastern part of the country which did not contain families of Loories or Loulies, who were the real primitive gipsies. In about the first or second century of the Hegira, these gipsies came down to the mouth of the Euphrates, and then settled in the marshes above the junction of the Tigris. They gave much trouble to the Caliphs for two or three centuries, until their depredations became so extensive that the Caliph Mamoon assembled a large army and forced 200,000 families of them to migrate to the frontiers of Asia Minor, where for 200 years they formed a sort of guard to the Mohammedan frontier against the Greek power. From that point they gradually moved into Asia Minor, and in the fourteenth century they crossed the Bosphorus and first appeared in Bohemia.

Ninth Meeting, 25th March, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTATION.—*Edouard Willems, Esq.*

ELECTIONS.—*William Balls, Esq.; Major W. B. Battiscombe; Capt. John Beaton* (3rd City Volunteers); *Captain William Brander* (24th Foot); *F. Cookson, Esq.; J. J. Grinlinton, Esq.; John MacGregor, Esq.; J. T. Margoschis, Esq.; Captain Francis Peel; W. B. Punsfer, Esq.*

ACCESSIONS TO THE LIBRARY FROM MARCH 11TH TO 25TH.—'The Slave Trade in Africa, &c., in 1872.' By E. F. Berlioux. Donor I. V. Irwin, Esq. 'Observations on the Geology and Zoology of Abyssinia.' By W. Blanford. 1872. Donors the India Office. 'Visits to High Tartary, Yarkand, and Kashgar.' By Robert B. Shaw. 1871. Donor the author. 'Die Baraba.' Von A. V. Middendorff. St. Petersbourg, 1870. 'The Euphrates Valley Railway.' By an Austrian Officer. Translated by Captain C. W. Wilson, R.E. 1872. Donors the War Office. 'New System of Measures, &c.' By W. Wilberforce Mann. New York, 1872. 'Jahres-Bericht der Nordeutschen Seewarte für das Jahr 1871.' Von W. v. Freeden. Hamburg.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF MARCH 11TH.—Chart showing the overland tracks from Perth to Eucla and Adelaide. By John Forrest, Government Surveyor. 1870. A Sketch-map of a Geological Exploration, north-east from Champion Bay, West Australia. By H. Y. L. Brown, Government

Geologist. Both presented by His Excellency Governor Weld, of West Australia.

The following paper was read:—

A Tour in North-Eastern Anatolia. By W. G. PALGRAVE.

STARTING from the Port of Trebizond, on the Black Sea, Mr. Palgrave journeyed 130 miles in a south-easterly direction, to the town of Erzinghian, on the Upper Euphrates; skirting on his way the edge of a vast moraine, bearing undoubted evidences of ice-action. From Erzinghian he proceeded west by north to the mineral-district of Kara-Hissar, visiting the silver and lead mines in the neighbourhood, and some of the numerous hot springs that stud the whole of that region. He then continued his journey, about 160 miles westward, to the mines of Hajjee-Koi, near Marsivan, finally returning to Trebizond.

The author, after alluding to the blank spaces in all maps of that country, and the many remarkable features with which it abounded, interesting alike to the geologist, the naturalist, and the archæologist, called attention to the undeniable vestiges of the so-called glacial period, in that part of Asia Minor, traces of which he himself met with in the Pyxartes Valley and Kelkeet Plateau; and the volcanic phenomena of remote date which he found in the vicinity of Kara-Hissar.

After some remarks on the antiquities contained in Erzinghian, and a brief notice of some of the tribes, Mr. Palgrave concluded with a detailed and interesting account of a visit to the mines of Tamzerah, distant about 13 miles from the town of Kara-Hissar.

[Further notice of this paper is unnecessary here, it having appeared in full in a publication not connected with the Society.]

Major MILLINGEN said he had visited Trebizond, and had passed over the Kolat Dagh on his road to Persia. Of the geology and mineralogy of the country he knew but little, and his geographical knowledge was based upon legs more than barometers. He had, however, published a work, 'Wild Life among the Kurds,' in which he described what he knew of the country and people. From Trebizond there were two routes crossing the ranges which ran parallel to the sea: one a winter route, called the Djenizli and Yerkiopru route; the other a summer route, going from Deïrmen-dereh to Gumush-haneh, and thence either to Erzinghian or Erzerum. The mountains behind Trebizond offered many facilities for the easy passage of caravans. The harbour of Trebizond was a poor and unsafe one, with no accommodation for loading or unloading vessels, but the mountains afforded means of communication with the interior. Riza had a much better harbour, but the ranges in the rear were much higher than at Trebizond, the peaks being something like 9000 feet high. In July, 1864, the lake on the top was covered with ice. The highest mountain in the range was the Emshin Dagh. In its course to

Georgia the Kolat Dagh was cut abruptly by a curve of the River Tcholok, which ran into the sea. The mountain chain was there called Djemil-dagh, because inhabited by a race of Caucasian origin, called the Lazes. In his book he had stated that in Asia Minor, brigands existed. Mr. Palgrave had not met with them, but he had. He once spent a night on the top of the range, with a band of seventy brigands, led by a chief of the name of Softah-Mehemet. They were all runaways from the army, and as he was also a runaway then they did not molest him. In the morning on his way down he met a band of 100 police going up in search of the brigands, who had just plundered a caravan travelling between Riza and Erzerum. In the year 1857, a French officer with his companions was taken and cut to pieces by the robbers between Erzerum and Trebizond. On one occasion he surrounded two villages, in which a number of the brigands had assembled, caught them, and gave them 400 lashes each.

Mr. PALGRAVE said he had described the people as he found them, and, as far as his experience went, the country was one in which any person might travel with perfect security; and those who did not look about for persons of a certain character would not find them. He mentioned this simply as an encouragement to those who wished to visit the country.

The PRESIDENT thought the different accounts given by Mr. Palgrave and Major Millingen were quite reconcilable. Major Millingen referred especially to Kurdistan, which lay to the east of the district Mr. Palgrave had described, and the country from Erzerum westward was in a much more advanced state, as regarded quietude and order, than parts further to the east. No doubt Major Millingen's sharp measures of repression and coercion were very necessary in Kurdistan, but they would be quite out of place in the peaceful agricultural districts west of Erzerum. Mr. Palgrave was a gentleman, who, whether he travelled in Arabia or in Asia Minor, amongst civilised people or in the desert, always collected materials for an instructive and interesting discourse; and it was to be regretted that he should be condemned to the drudgery of a consul's office, instead of being engaged in travel, which would be more agreeable to himself, and much more beneficial to his country.

Previous to adjourning the meeting, the PRESIDENT said he had that day received a letter from Dr. Mueller, the head of the Medical College at Melbourne, announcing that an inspector, a Mr. Gillmore, had at last come upon traces of Dr. Leichhardt, who was lost in the interior of Australia some years ago. The bones of some of the party had been found; and a piece of an ornament, obtained from the natives, had been sent to the Society and identified as of the same description of ornament that Leichhardt's party had with them. On previous occasions, trees had been found marked with the letter "L," and it was to be hoped that now the exact line of his route might be traced, and the place of the final catastrophe discovered, as there must be a large accumulation of bones, not merely of the party composing the expedition, but also of the horses, mules, &c., which accompanied them. Geographical progress had been very rapid of late years in Australia. The line along which Stuart passed in his journey across the continent was now the line of the telegraph, which ran from Adelaide 1200 miles due north. There remaining but 300 or 400 miles to complete the entire distance to the Gulf of Carpentaria, and it was expected that this northern section would shortly be completed.

Tenth Meeting, 22nd April, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Alfred Cooper, Esq.; Henry Gale, Esq.*, C.E.; *James Eglinton A. Gwynne, Esq.*, C.E., &c.; *William Stewart, Esq.*, M.D.

ACCESSIONS TO THE LIBRARY FROM MARCH 25TH TO APRIL 22ND.—'A Complete Collection of Voyages and Travels.' By John Harris. 4 vols. 1784. Donor J. J. Merriman, Esq. 'Account of the Operations of the Great Trigonometrical Survey of India.' Vol. I. (Standards of Measure and the Base Lines.) By Col. J. T. Walker. Dehra Doon, 1870. Donors the India Office. 'Overland Communication with Western China.' By R. G. Donor the author. 'The Imperial Gazetteer.' 2 vols. 1872. Donors Messrs. Blackie and Sons. 'Informe de los Exploradores del Territorio de San Martin.' Bogota, 1871. Donors the Exhibition Commissioners of Bogota. 'Extracts from General Report of the Trigonometrical Survey of India, 1870-71.' By Major T. G. Montgomerie. Dehra Doon, 1871. Donors the India Office. 'Les Oscillations des Côtes de France.' Par M. Delesse. Paris, 1872. Donor the author. 'Topography of the Oil Region of the Punjab.' By B. S. Lyman. Philadelphia, 1872. Donor the author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF MARCH 25TH.—Mouths of the River Amazon. By Dr. J. B. G. Campos. Presented by the author, through E. Weller, Esq., F.R.G.S. 4 Maps of the Yellowstone Lake and the National Park, also of the Upper and Lower Geyser Basins on the Fire-Hole River, Wyoming Territory, U.S. Presented by F. V. Hayden, U.S. Geologist. India: District of Cachar and Looshai Country, and Map of the Eastern British Frontier, Burma, &c. Presented by the Secretary of State for India, through the India Office. Map of Paraguay, showing the Boundary, as settled by the Treaty with Brazil. Presented by Maximo Terrera, Consul-General of Paraguay.

Before calling upon Capt. Sherard Osborn to read his paper, the President read the following letter which he had received from Dr. Kirk:—

"British Agency and Consulate, Zanzibar,
'DEAR SIR HENRY, January 15, 1872.

"Before getting your letter of the 2nd October, I had sent off a few lines by way of opening a correspondence and placing myself in communication

with you, since your election to the Geographical Chair. I had little to tell you then: simply that Kilimanjaro, one of the African snow-mountains, whose existence had been denied not many years ago, and had hitherto been only partially ascended by C. von der Decken, has now been reached and ascended, without danger or difficulty, by a missionary on a holiday excursion from Mombassa.

"This shows how quickly, once the road is known, others may follow. The only point of scientific interest in this last ascent rests in the small collection of Alpine plants kindly placed in my hands, and transferred to Kew.

"I should very much like to see some explorers follow the trade-caravans that every year start out from Pangani and Mombassa, and, passing the foot of the Kilimanjaro and traversing the salt-plains covered with thick layers of crude carbonate of soda, pass the wild Masai and Wakwasi to the shores of the Nile Lakes, there meeting with the people of Uganda and others from Karagwe. This would be a journey full of interest and adventure; and I was astonished that Mr. Stanley, who, as correspondent of the 'New York Herald,' seems to hold a roving commission, did not follow the new and unexplored path, rather than take the dull and well-known road to Ujiji, in which there can be little of interest left for an unscientific traveller. You have heard of the disasters that befel the Arabs of Unyanyembe in September last; since then there has been no communication from that part.

"I wrote at once to Mr. Stanley, and asked him to do for me all he could in saving the second lot of stores sent on to Livingstone. These had reached Unyanyembe, and had been started by the chief on the road to Ujiji, when the head man in charge died, and the party fell back on Unyanyembe; before matters were re-arranged, the war had broken out. This is all we know, and we have no details, whether Dr. Livingstone's things formed part of what was lost or not. I fancy not, as the chief part of the settlement was not robbed, only the outlying settlers of the station.

"My whole reliance is in Mr. Stanley; he will do his best, I feel assured, and I have given him full power to act. What his aims are, he never explained; at first he intended going up the Lufiji River, and so to Tanganyika. I believe his ultimate object is to meet with Livingstone. He is the agent of a New York paper, and in what way they intend getting their expenses back I cannot tell; but, as it is a commercial affair, there is but little chance of getting much from Mr. Stanley as original news, unless through the columns of the paper he writes for. I doubt not, if in possession of real news of Dr. Livingstone, he would try to pass it on direct to New York, in order that it might first be published in the 'Herald.' He used to amuse us here with tales of how he passed on details from the Abyssinian War to New York, and outwitted the London correspondents.

"He has, however, now met with a severe check; has lost goods and men, and one, if not both, of his white companions. One died on the march up, the other was idiotic, and almost dying at Unyanyembe. Mr. Stanley himself was ill, and, after the disastrous fight in which he allowed himself to be involved, he was so ill that he had to be carried on a litter. If the Negro Chief is again beaten by the combined Arab forces, he will be able to push on, and we are sure also to receive news from Ujiji, and, perhaps, letters from Livingstone; but, until this war is at an end, we can hope for nothing unless by the roundabout way of Cazembe or Wemba. The Karagwe road, I am told, is stopped, and, if this continues, it will force open that by the Masai. The last dispute of a similar nature closed the Ujiji ivory-market for three years, when the accumulated proceeds came down. It will be the same again once the road is open, and I hope that may come about soon.

"You wish me to say confidentially what I think of Dr. Livingstone's position; and I see that you are not averse to taking any measures into con-

sideration that might lead to his being communicated with, if only a fair prospect of success offered. This, I think, Mr. Stanley will accomplish.

"As to Livingstone's position, we know that, at Cazembe's town, he was out of all stores, and living on the generosity of various Arab parties met with. These Arabs have long since reached the coast, and returned on other expeditions; some of them to Ujiji, others to Cazembe.

"At Ujiji we knew, from Dr. Livingstone himself, that he found a few of the things sent off years ago; he had been ill, and illness had affected his temper: he warned us, indeed, that we might expect no further details of his proceedings, until such time as he came to publish them in person; this, he said, he regretted, as an accident on the way might lose for ever the whole results he had accumulated. Such a letter was obviously penned when African fever lay heavy upon him, and when he was also out of quinine.

"It was before the large supply of all sorts of stores reached Ujiji; then he had set out to a place, distant about twenty or thirty days' journey, to the west of the sea of Ujiji. The object of this expedition was clearly to learn the truth regarding that lake, to which he had been told the waters of Cazembe and the chain of lakes he had followed all converged. No one with whom I have come in contact, has yet been able to describe the country of Manyema; it is an ivory-country, visited by the Ujiji traders, but these men seldom come to the coast.

"Livingstone followed an Arab caravan; and we have heard of their safe arrival at Manyema, but not of their return to Ujiji. On their way back both the Arab caravan and Dr. Livingstone came to a standstill, and the men I had sent to be his servants had left Ujiji with stores to assist him. Objection has been taken to the story that Livingstone wrote to Ujiji for assistance, because no one in Ujiji could read his letters. This is no objection whatever, as, no doubt, he would get his companion, Mohammed bin Gharib, to use his pen and write in Arabic or Swaheli.

"If Dr. Livingstone reaches Ujiji, we know he will find supplies, diminished, no doubt, by expenses on the way, and losses in passing that awful march, where the men died from cholera, but yet, I trust, sufficient for all he requires. If he takes up goods at Ujiji from the traders at five hundred per cent., his drafts will be duly honoured here by me; and, once at Ujiji, I do not see any difficulty in his way either to return to Zanzibar, or to push on, as he seems to have intended, by taking canoes and following the lake to the north. Livingstone's whole aim and object has been to trace the Nile further south than had been done by others; and, we may rest assured, he will not come out of Africa to leave that undone. My own conviction is that he has by this time left Ujiji and passed north, to trace the Tanganyika, and discover its connection if any, with Baker's Lake. If he returns without doing this, we may be quite sure he has made some great discovery regarding the course of those lakes that pass Cazembe's town. One thing we must keep in mind,—there is nothing discouraging in the last news we have received of him, and we cannot expect to hear again until the war at Unyanyembe has been closed.

(Signed) "JOHN KIRK."

The following Paper was then read:—

On the Exploration of the North Polar Basin, with a Résumé of recent Swedish, German and Austrian attempts to reach the Polar Circle from the Atlantic Ocean. By Capt. SHERARD OSBORN, R.N., F.R.G.S., F.R.S.

OUR able and indefatigable secretary, Mr. Clements Markham, has recently, in a valuable Memorandum, called the attention of the

President and Council of the Royal Geographical Society to the necessity of public interest, in this country, being again directed to a scientific exploration of the 1,131,000 square miles of the globe's surface, which still lie unexplored around the northern pole of our earth. It will be in the recollection of the members of this Society that, in 1865, I read a paper on this subject, and therein to the best of my ability, urged the necessity, on many grounds, for an exploration of the Polar basin, and set forth the arguments in favour of reaching that unknown area by way of Baffin Bay and Smith Sound.

That route, it is maintained, is the one which two hundred and odd years of experience have given to British navigators and explorers the best assurance of reaching the 80th degree of north latitude, with the greatest certainty, and smallest amount of risk, to ship and life.

Backed by all the scientific bodies of this country, our late distinguished President and Council took immediate steps for a revival of English Arctic enterprise, and wrote to, as well as had an interview with, the then First Lord of the Admiralty, His Grace the Duke of Somerset, with a view to obtaining that assistance from the Navy, which we believed would give the best guarantee for a successful geographical exploration of the area under consideration. Unfortunately for the purpose we had in view, an eminent German geographer renewed a theory which he had first started at a still more inopportune time during the search for Franklin,—and had English navigators then listened to it, that search would have been a failure, the North-west Passage would not have been discovered, and the geography of the lands between Baffin and Behring Straits would still have remained unknown; his theory being that the true way to reach this unknown area, was by following in a very different direction what he believed to be a current of warm water, flowing to the north-east from the tropical regions of the Atlantic towards the shores of Spitzbergen and Nova Zembla. He maintained, in the face of three centuries of experience, that a route could be found into the area round our pole in that direction, and that a navigable sea existed there.

His arguments and opinions caused a division amongst Arctic authorities in this country; and the First Lord of the Admiralty, though apparently sufficiently enlightened to entertain the general proposal, very naturally declined verbally to assume the responsibility of deciding which route was the right one, until geographers and Arctic authorities could themselves agree on so important a point.

Disappointed though I and others naturally felt at this first result of our efforts, still we could not but acknowledge the justice of the course taken by the Admiralty; and, as a matter of policy and common sense, I advised Sir Roderick Murchison to be patient, and wait till time had proved the fallacy of theories based upon the existence of an imaginary open Polar ocean, and upon the possibility of ice-navigation late in the autumn.

Seven years have now elapsed, and though I am prepared to do justice to the zeal, enterprise, and courage, with which the German explorers have endeavoured to give effect to the theories of their speculative geographer, and to the noble fortitude with which they have faced severe hardships in trying to reach the Polar basin, between the east coast of Greenland and the meridian of Nova Zembla, yet I maintain that the result proves the learned but purely theoretical German geographer to be wrong, and the experienced Arctic voyagers, who thought with me, to be right. I do not propose, in a short paper adapted for our evening discussion, to attempt to give full details of the two German Expeditions of 1868 and 1869, which sailed from Bergen and Bremen respectively; and there is the less need to do so, as our distinguished Associate, Admiral Sir Leopold M'Clintock, in January, 1871, gave us a paper containing an excellent *résumé* of the last expedition.

The result of those two German efforts was, in my estimation, calculated only to confirm our opinion that between Spitzbergen and the coast of Greenland there was no navigable passage through the ice-drift from the Pole, either for steamer or sailing-ship, to the northward of points reached by Hudson two centuries, by Phipps one century, and by Scoresby, Buchan, Parry, Clavering, and Sabine, half a century ago. The Pendulum Islands and adjacent coast of Greenland were the furthest point northward of the German, as it had been fifty years before of the English navigators. Captain Karl Koldewey, who commanded both expeditions, happily relieves me from the pain of feeling that I differ, in this respect, from one who so gallantly endeavoured to test Dr. Petermann's theory. In May, 1871, after his experiences of Petermann's route to the Polar basin, he writes as follows:—

"One can hardly resist the conviction that the hope of attaining the North Pole by ship, or of finding an open sea around the Pole, are alike among the most improbable of things.

* * * * *

"I confess that I myself was misled by representations in Dr. Petermann's 'Geographische Mittheilungen,' and held it to be at

least possible, by following a line of coast, to penetrate by ship far into the central Arctic Regions, and then certainly to make one's way to the Pole. A winter in East Greenland, the most careful observation of those mighty masses of ice, their movements and formation, and of the whole conditions of temperature, and finally the careful study of Arctic literature in its original form, and not by means of one-sided extracts, have radically cured me and all my companions of this idea.

* * * * *

"If its principal object is to be the nearest possible approach to the Pole, I am quite of Osborn's opinion that the best way appears to be through Smith Sound. Here one can penetrate by ship every year to the 78th parallel, and then one has a continuous line of coast running north, which has been sighted as far as the 82nd parallel. Along this coast one would have to work one's way, in spring, with dog-sledges.

* * * * *

"*I consider it a wild undertaking to penetrate towards the Pole by ship, between Spitzbergen and Nova Zembla.*"

Comment on this honest seaman's opinion is unnecessary, and no amount of specious reasoning, spread over any amount of pages, by any mere theorist, be he German or English, can undo the effect of evidence so strong and conclusive.

Before touching on the voyage undertaken last year by Lieut. Payer, I must refer to the results of the Swedish expeditions to Spitzbergen; and it is the more incumbent upon me to do so, because the Duke of Somerset rested his decision (to delay further action with respect to the representation that was made to him) upon the importance of first being furnished with the conclusions arrived at by the Swedish explorers.

Nordenskiöld, Von Otter, and other intrepid Scandinavian men of science, have led no less than four expeditions to the verge of the unknown Polar Region, on the Spitzbergen meridian, between the years 1858 and 1868, with the object of making researches into natural history, and achieving such discoveries as might prove to be feasible.

The opinions of Nordenskiöld and Von Otter are most valuable, and they fully confirm the experience of centuries, that in the summer or actual sailing season in the Polar Seas, it is not possible to penetrate through the pack. They observe, however, that at the season when, in consequence of the heat of the summer and the influence of ocean waves and streams, the ice-masses have been

reduced to their minimum—that is to say, in the autumn—theorists had thought it possible to advance further than in summer.

They therefore made the attempt, and are most emphatic in its condemnation. Their conclusion is, that during the autumn a vessel might possibly reach a latitude considerably higher than that which has been obtained by the early summer expeditions. But they further point out that progress would soon be rendered impossible by the cold and darkness, the winds accompanied by snow-storms, the heavy seas covered with drifting floes, and the young ice. They also record their opinion that an open Polar Sea is a mere hypothesis, destitute of all foundation in the experience which has been gained, and that the only way to approach the Pole, which can be attempted with any probability of succeeding, is that proposed by English authorities of exploring on sledges in the spring. Here, then, are the reports for which the Duke of Somerset desired to wait, and by them we find that the Swedish and German Commanders of Arctic Expeditions, after gaining actual experience in ice-navigation, fully agree with their brother-explorers of England in the route that should be taken, and in the means by which success must be achieved.

Such were the results of the German and Swedish Arctic Expeditions up to the year 1871. I now proceed to give you a *précis* of a very interesting voyage, made under Austrian auspices last year, into the sea between Spitzbergen and Nova Zembla.

Lieutenants A. Weyprecht and Julius Payer, of the Austrian Navy—the latter of whom was associated with Captain Koldewey in his voyages to the North—appear to have very ingeniously thought of following the supposed Gulf Stream into the Polar Basin, by keeping more to the eastward of Spitzbergen, and towards Nova Zembla, than Koldewey had done, and especially directed their attention towards Gillies Land.* After many delays, Payer and his associate, Lieutenant Weyprecht, put forth from Tromsö, in Norway, on the 21st June, 1871, in a small hired native vessel of 70 tons, and a crew, all included, of eight souls. Finding they could not reach Gillies Land in a direct course, they endeavoured to work their way up the Stor Fiord. Here they were met by southerly currents and heavily drifting ice, against which they struggled fruitlessly until the 19th August, when, for good and sufficient reasons, they abandoned the Stor Fiord route towards Gillies Land, and attempted then to reach it by following the eastern coast of the outermost islands of the Spitzbergen group.

* 'The Polar Expedition of A. Weyprecht and Julius Payer in the year 1871.' Geographical Society, Vienna, 1872.

On the 19th August they reached Hope Island. It was free from ice, and they anchored there, and logged a current running past the ship W.S.W. three knots per hour. Leaving Hope Island on the 21st August, they had reached lat. 77·17° N., and between the 28th and 36th degree of long. E. found much lighter ice than had hitherto been met with. On the evening of the 22nd the Report says:—

"Of King Charles Land we saw nothing, although only 40 to 50 miles distant. In the evening, for a short time, we had a clear sky towards the northward; otherwise we were enveloped in eternal fog. The vicinity of the land, however, was proclaimed by the decreasing depth of the sea, and numerous bear-tracks on the ice."

Between that date and the 29th they appear, on the parallel of 77·30°, to have been beating about in perfectly navigable ice, but the fogs were so extensive they could not see far.

On the 29th August they had reached 42° E. long., and were much astonished to be able, on the 30th, to pass 78th degree lat. and 41·30° E. long. without encountering ice; but that night they struck against the ice-edge. The ice, however, was moving to the north instead of to the east. On the 31st, at mid-day, the Report states they were in 78·25° N. lat., 42° E. long; at eight o'clock in the evening, in 78·41° N. lat., amongst ice, which seemed to be moving north-east. To the west the ice lay dense, with strong ice-glare and detached icebergs, but to the north it was loose or open. On the 1st September, midnight, they reached their highest latitude, 78·48° N., dead reckoning, and by indifferent observations at noon, on the 2nd, they were in 78·37° N., 42·32° E.

I now particularly call your attention to the two following paragraphs of the Report:—

"Very thick fog, with a stiff, contrary wind, prevented our getting forward in a northerly direction. The condition of the ice would have been no obstacle. The 79th parallel we could, without very great effort, have passed, only, with the stiff north wind, it would have taken at least a day's cruising, and the short time which still stood at our disposal was too precious for us to be willing to sacrifice a whole day for a few miles.

"Many signs led us here to infer the near neighbourhood of land. We saw much drift-wood, which, further south, we had hardly ever met with; and and at one spot, where we were fishing, there was fresh mud, also sea-weeds, and much fresh-water ice, which is easily known by its transparency. An almost infallible sign was six southward-flying eider-ducks, which never go far away from the land. Unfortunately, however, the fog was always so thick that

we never got a wide prospect. These thick fogs with a north wind are very remarkable in such high latitudes.

"A further energetic northerly advance was no longer to be thought of: the obstacles being our scanty provisions, the disinclination, already mentioned, of the crew, and, lastly, the condition of our prow.

"The quality of the ice in these high latitudes was by no means difficult. Except detached and small icebergs, and one solitary larger old slice, we saw nothing implying heavy pack-ice in the north."

All these signs, read by the light of Arctic experience, point, in my opinion, to the existence of land not very far north of the position reached in the 42nd Meridian by the Austrian Expedition, and by no means towards an opening into the Polar Sea.

To gratify their curiosity, and to allay the fears of the Norwegian seamen, the ship now stood towards the coast of Nova Zembla, to ascertain whether they had been merely steering up a bight in the ice. The result proved that, from their furthest, on the 1st September, to the coast of Nova Zembla, the sea was free from ice. They then appear, owing to the south-west winds, to have been forced back on the 6th September in a northerly direction to 78·5° N. lat., and 56° E. long., where, it is worthy of remark, they met ice, in an east and west direction, with a heavy sea beating against it. The expedition now struggled homeward through heavy continual storms from the south-west, and anchored in Tromsö on the 4th October; and the Austrian navigators do not fail to remark that the increasing length of the nights and heavy snow-storms would have rendered the navigation highly perilous, had they had the misfortune to have fallen amongst ice. A contingency which was avoided by the heavy south-west gales, and consequent warm-water drift pressing the pack-ice away to the northward and westward, and northward and eastward.

Lieutenants Weyprecht and Payer, having been unable to trace this open water on the north shore of Nova Zembla to its furthest limit, appear to jump at the conclusion that they have discovered a key, to use their own words, "to the mystic Polynia, the open sea to the north of Siberia."

This may be so: the word Polynia means spaces of open water in a frozen ocean; and there may be many such spaces, if not a continuous channel of open water, late in the autumn, say October, extending from Nova Zembla, along the shores of Asia, to Behring Straits; and I do not deny that an exploration of this open water may yield most valuable results in a geographical and generally

scientific point of view. But, with all kindness and sympathy for them, I appeal to their own Report, and the results obtained, whether in observations of ice, water, depths, and temperatures, in proof of the fact that, at their furthest north, they were merely approaching those lands which previous visitors to Spitzbergen have frequently reported were seen to the east and north-east, and generally known under the term "Gillies Land," or, more recently, King Charles Land; and I only regret to learn from Sir Leopold McClintock that the gallant Austrians, who are again about to put forth on a voyage of discovery, do not intend to return there, and explore a region so likely to yield such interesting results in a geographical point of view; though I feel confident that the Polar basin will not be explored by any expedition in that direction.

To sum up, another seven years' labour only goes to confirm old Arctic experience, that the outpour of Polar ice is too heavy and continuous, from Gillies Land to Greenland, for any ships to penetrate through it. I believe that outpour to be incessant, both summer and winter, and that sledging expeditions at any season of the year, northward from Spitzbergen, would encounter to-day the same difficulties Parry did in the summer of 1827.

With respect to the Nova Zembla Sea, there is evidently land to the northward, and the south-west gales of the Atlantic force up a body of warm water in the autumn, by which a route may be found round Nova Zembla into the open water on the Siberian coast. Indeed this is already proved to be possible by a Norwegian, Captain Mack. On these grounds, and on those already stated in my previous paper, I would again appeal to the President, Council, and Members of the Royal Geographical Society, to turn their earnest attention during this summer and autumn towards a resumption of the exploration of the Polar area, by way of Baffin Bay and Smith Sound, and by means of sledge travelling parties, such as explored so many hundreds of miles of coast-line in former years.

This route recommends itself on the three following grounds:—

First. That it is the most advanced known position towards the Polar area, with almost continuous land extending to the 82° lat. N.

Secondly. That from it, to the north-east and west, important geographical discoveries and scientific results await us.

Thirdly. That this route offers the best guarantee for the safety of the people employed in the exploration of a vast unknown area.

If the Arctic Committee now sitting under the able presidency of our distinguished and veteran Associate, Admiral Sir George Back, can show, on these grounds, that Polar exploration can and

ought to be carried out, I trust, for the sake of my country and profession, that our Admiralty may be induced to open to the Royal Navy, this field for glorious enterprise and national renown. The First Lord of the Admiralty, Mr. Goschen, in a recent speech to the House of Commons, speaking of our Navy Estimates, justly said: "It must not be supposed that all this money was spent on war, but that a great portion was spent on duties, which, notwithstanding the reputation this country had most unjustly got of pursuing a selfish policy, redounded to the benefit of the world at large as much as of our own country."

The cheers with which such a statesmanlike view of the duties of the Royal Navy was received, would, I am sure, be re-echoed throughout the length and breadth of our land; and knowing as I do that there never was a time in the history of our Navy, when a finer body of seamen and gallant officers, highly trained in scientific acquirements, could be better made available, or more earnestly rejoice at such a field for individual enterprise being thrown open to them, I think it would be a crying disgrace if the accomplishment of Polar discovery, a labour undertaken by English seamen and explorers in the time of Queen Elizabeth, and continued to that of Queen Victoria, should be achieved by the sailors or explorers of any other nation. Rather than see those laurels wrung from us, I would, much as I believe in the advantage and certainty of a Government Expedition, advocate an appeal, on the part of this Society, to send forth a private expedition, in the spring of the year 1873.

The PRESIDENT, before calling for any remarks on Captain Sherard Osborn's paper, wished to remind the Society that the Arctic Regions had been for a long period the proudest field of triumph, not only of the Royal Geographical Society, but of the British navy and the British nation. He was glad the subject of an expedition to the North Pole was again brought forward, by a gentleman so competent to discuss it as Captain Sherard Osborn. He was also pleased to see nearly all our great Arctic authorities present, men who had carried the flag of England into those seas, and who had been mainly instrumental in obtaining for this nation that Arctic glory we were so proud to possess. There were also present authorities in matters of science, who, he trusted, would give their opinions as to the scientific results to be looked for from an Arctic expedition.

Admiral Sir GEORGE BACK said, Captain Osborn had so completely exhausted the subject that he had little else to say, than to give his perfect approbation of every word he had uttered. The expeditions which had recently gone east and west of Spitzbergen, however encouraging, might be considered simply tentative to the great object of Polar research. The direct route to the North Pole remained very much as it had been left by his own dear friend, Sir Edward Parry. Without undervaluing the persistent and zealous efforts of our gallant contemporaries, but rather honouring them for what they had done, the Arctic Committee had considered the question seriously, and had come to the determination that the route which offered the greatest probability of success for Polar exploration, was by Smith Sound, or

the route taken by the gallant American, Dr. Kane. The difficulties and contingencies of such an exploration cannot be calculated beforehand, though it is well known they partly vanish in making the attempt. It would be most mortifying to reflect, that the very prize for which our country had been contending more or less for over three centuries, should, through an unwonted and unnatural apathy on our part, glide away from us into the hands of a younger and more energetic nation. There had been Swedes, Danes, Germans, Norwegians, Russians, Americans, and, prior to their great calamity, even the French were fitting out an expedition to Behring Straits; while we, whose birthright it was, were left ingloriously in the eddy. Captain Osborn had given the most convincing reasons for our making another attempt; and he was certain that, when the time came for carrying it out, they would have the active co-operation of every member of the Royal Geographical Society.

Dr. HOOKER said, as a botanist he took great interest in Arctic exploration, for the vegetation of the Arctic Regions threw as much light upon the geographical distribution of plants on the surface of the globe as any that he knew of. On the return of Sir Edward Belcher's expedition from those regions, a series of rocks collected in the neighbourhood of Disco, by his former fellow voyager, Dr. Lyall, were placed in his hands, containing an accumulation of fossil leaves of plants, totally different from any now growing in that latitude. These fossils he forwarded to Professor O. Heer, of Zurich, for investigation, who had brought forward the most convincing proofs that that latitude was once inhabited by extensive forests, presenting fifty or sixty different species of arborescent trees, most of them with deciduous leaves, some 3 or 4 inches in diameter,—the elm, pine, oak, maple, plane, &c.; and, what was more remarkable still, evidences of apparently evergreen trees, showing that these regions must have had perennial light. It seemed extremely probable that the vegetation, which belonged to the miocene period, extended over a large portion of the Northern Arctic Regions. It would be of great interest to ascertain whether such vegetation extended even to the Pole; and he knew of nothing that would give greater assistance in solving this problem than the proposed expedition along Smith Sound. Turning to the existing flora of Greenland, he pointed out that, though one of the most poverty-stricken in the globe, it was possessed of unusual interest. It consisted of some 300 kinds of flowering plants (besides a very large number of mosses, algæ, lichens, &c.), and presented the following peculiarities:—1. The flowering plants were, almost without exception, natives of the Scandinavian peninsula; 2. There was in the Greenland flora scarcely any admixture of American types, which nevertheless were found on the opposite coast of Labrador and the Polar Islands; 3. A considerable proportion of the common Greenland plants were nowhere found in Labrador and the Polar Islands, nor, indeed, elsewhere in the New World; 4. The parts of Greenland south of the Arctic circle, though warmer than those north of it, and presenting a coast 400 miles long, contained scarcely any plants not found to the north of that circle; 5. A considerable number of Scandinavian plants which are not natives of Greenland, are nevertheless natives of Labrador and the Polar Islands; 6. Certain Greenland and Scandinavian plants, which are nowhere found in the Polar plains, Labrador, or Canada, re-appear at considerable elevations on the White and the Alleghany and other mountains of the United States. No other flora known to naturalists presents such a remarkable combination of peculiar features as this, and the only solution hitherto offered is not yet fully accepted. It is, that the Scandinavian flora—which he (Dr. Hooker) had shown evidence of being one of the oldest on the globe—did, during the warm period preceding the glacial—a period warmer than the present—extend in force over the Polar regions, including Greenland, the Polar American Islands, and, probably, much now submerged land in places connecting or lying between

Greenland and Scandinavia, at which time Greenland no doubt presented a much richer Scandinavian flora than it now does. On the accession of the glacial period, this flora would be driven slowly southward, down to the extremity of the Greenland peninsula in its longitude, and down to the latitude of the Alleghanies and White Mountains in their longitudes. The effect in Greenland would be to leave there only the more Arctic forms of vegetation, unchanged in habits or features; the rest being, as it were, driven into the sea. But the effect on the American continent would be to bring the Scandinavian flora into competition with an American flora that pre-occupied the lands into which it was driven. On the decline of the glacial epoch, Greenland, being a peninsula, could be re-peopled with plants only by the northward migration of the purely Scandinavian species that had been previously driven into its southern extremity; and the result would be a uniform Scandinavian flora throughout its length, and this an Arctic one, from north to south. But in America a very different state of things would supervene: the Scandinavian plants would not only migrate north, but ascend the Alleghanies, White Mountains, &c.; and the result would be, that, on the one hand, many Scandinavian plants which had been driven out of Greenland, but were preserved in the United States, would re-appear on the Polar Islands and Labrador, accompanied with sundry American-mountain types, and, on the other, that a few Greenland-Scandinavia types, which had been lost in the struggle with the American types during their northward migration, and which hence do not re-appear in Labrador and the Polar Islands, might well be preserved in the Alleghanies and White Mountains. And, lastly, that a number of Scandinavian plants, which had changed their form or habit during the migration in America in conflict with the American types, would appear in the Polar Islands as American varieties or representative species of Scandinavian plants. Whether or no this be a true hypothesis, it embraces all the facts; and botanists look anxiously to further explorations in the northern parts of Greenland for more light on the subject, and especially for evidence of rising or sinking of the land in Smith Sound and the countries north and east of it, and for evidence of ancient connection between Greenland and Scandinavia; for observations on the temperature, direction, and depth of transporting currents in these seas, and on the habits of its ruminant migrating animals that may have influenced the distribution of the vegetation by transporting the seeds. Such facts as those of the existence of ancient forests in what are now Arctic regions, and of the migration of existing flora over lands now bound fast in perpetual ice, appear to some naturalists to call for vaster changes than can be brought about by a re-disposition of the geographical limits of land and sea, and to afford evidence of changes in the direction of the earth's axis to the plane of its orbit, and perhaps of variations in the ellipticity of the orbit itself.

Admiral G. H. RICHARDS said he had always looked upon Greenland as a country that had reason to complain of the way in which it had been treated. It was a body without head, tail, or limb. Although Greenland was no child of ours, he had felt that, geographically, we had adopted it. It was our duty, he thought, to complete the symmetry of Greenland, by exploring the northern end, and in doing so we should probably find the North Pole. He did not attach much importance to finding the North Pole; if it was found incidentally, well and good. He would call attention to the fact, that for the last twenty-five years this country had made small progress in the way of Arctic Exploration, except in the searching for Sir John Franklin; and although we had made many discoveries during that time, they had been incidental discoveries. Had we been purely exploring for only one-tenth part of that period, there would be nothing left to discover. Therefore, he hoped the Government would send out an expedition. He was not himself in favour of private enterprise. Private enterprise laboured under many

disadvantages: he did not know of any private expedition that had succeeded, except one, and that was the expedition under Sir Leopold McClintock. The chief was an experienced Arctic navigator, he was supported by officers of his own profession, and the crew was composed principally of British seamen who had just returned from a Government Arctic Expedition, many of them under his own command. Although they were bound by no ties or laws of hard discipline, it was a point of honour with them to conduct themselves in every way as if they were on board a ship of war. To that he attributed its success, and it was for that reason he was in favour of a Government expedition. He fully appreciated the efforts of the Swedes, Prussians, and others,—they had accomplished much to the advantage of science; but he maintained that they had been productive of little in the way of new discovery. He would as soon undertake an Arctic expedition in a penny river-boat. If any expedition succeeded, it would be one sent by this country; and he trusted it would be effectively carried out.

The PRESIDENT was sure the meeting had been much gratified at hearing the observations of Admiral Richards, the more especially as he was the professional adviser of the Admiralty. He trusted Admiral Richards would imbue the Admiralty with the sentiments he had expressed to the meeting.

Captain Sir LEOPOLD MCCLINTOCK said, as a naval officer and an Arctic explorer, he was sorry to say that our experienced Arctic men were passing away. It was now twenty years since Government had sent an expedition to the Arctic Regions, and at the present moment we could find but few officers or men competent to undertake another expedition. A few years hence we should probably have to fit out an Antarctic expedition to observe the transit of Venus. We should have to entrust that costly and difficult expedition to unskilful persons, unless we kept up our practice in the mean time. Thirty-three years ago, the only Antarctic expedition ever sent out by the British Government, was placed under the command of that most experienced Arctic navigator, Sir James Ross, and nothing could have been more complete and triumphant than his success. Therefore, he was for Arctic exploration in any direction even; the attempt to reach the North Pole was the highest object remaining for the exercise of geographical and maritime enterprise. An expedition by Smith Sound would give us as much practical experience in ice-navigation as would suffice for the next ten or fifteen years. He believed that route afforded the best chance of reaching the North Pole, and also the safest retreat in the event of a reverse. Of all the suggested routes, it was the least dependent upon the accidents of season. We had heard lately of the N.E. route as a favourable one, because open water had been seen off Siberia by Wrangel and others. Yet it was remarkable that, in 1847, Wrangel himself proposed that an attempt should be made by Smith Sound, in dog-sledges; showing that, in his opinion, there was no open Polar sea. In connection with what Dr. Hooker had said, he might state that, in Banks Land and Prince Patrick Land, there were hill-sides covered with semi-fossilized wood, much of it still fit to be used as firewood; from this he inferred that the time when those lands were covered with trees was not very remote. The proposed expedition did not contemplate any commercial advantages, such as were derived from the expedition to Baffin Bay in 1818, which opened up a whale-fishery; and from Beechey's voyage to Behring Straits, which opened up the whale-fishery now carried on there; nor were we to expect the discovery of vast deposits of fossil ivory, such as had been found in the Liakhov Islands off the coast of Siberia.

The PRESIDENT called upon Dr. Carpenter to explain the prospective advantages to physical geography, to be derived from this expedition to the North Pole.

Dr. CARPENTER looked upon the proposal as of peculiar interest, as it would be the complement of another expedition which Government had undertaken to send out, for the prosecution of scientific inquiry into the physical and

biological condition of the deep sea in various parts of the globe, ranging, he hoped, to the edge of the southern ice-field. But he apprehended it would not be able to reach the North Polar basin, and it was extremely important that a North Polar expedition should be carried out in connection with the other. Last year he explained his views on the general oceanic circulation, as dependent upon difference of temperature purely—difference of temperature giving a different specific gravity, therefore difference of pressure; which would necessarily produce a continued outflow of cold water along the floors of the ocean-basins from the Polar areas towards the equator; and, on the other hand, a continual movement of a more superficial stratum of warm water towards each Polar area. The inquiries that had been made during the last twelve months had only confirmed that view. When these researches were commenced, the general notion in this country, and among German physical geographers, was the prevalence of a temperature of 39° in the deep sea. That had been completely exploded, at least so far as the Atlantic was concerned; and it was now well known that salt water at 28° (just on the point of freezing) was heavier than water at 39°, which was formerly supposed to be the temperature of the greatest density of salt water, as it is of fresh. The ignorance which still exists on this subject is shown by the fact that, in a recent paper, Dr. Mühry spoke of cold water overflowing warmer water. This can only be in exceptional cases; as when the surface-water, chilled by the melting of icebergs, is at the same time rendered lighter by the reduction of its salinity. Taking the temperatures obtained by Lieutenant Payer between Spitzbergen and Nova Zembla, he observed that they corresponded exactly with the temperatures he should have expected to find in that region; and, so far from becoming warmer as the thermometer went down to greater depths, the water became colder. The warm stratum at the surface was about 40°; at 300 or 400 feet down, the temperature was about 32°; and at 800 feet, the thermometer sank to 29°·7. Farther north, at 77½° N., they found that the warm stratum had cooled down on the surface to 36°, and became much thinner: for, at 40 or 50 feet down, they came at once to a temperature of 32°, and at 120 feet to 29°. Of course, if there should be land beyond the northernmost point of Payer, the inflow of warm water in that direction would cease; and if Smith Sound had a tolerably deep channel, extending continuously northward, while there would be an outflow of cold Polar water at the bottom, there would be a tendency to inflow of warm water along the surface of that channel, as far as it extended. He merely threw out that hint with reference to the particular route chosen. But, with regard to the general question, the Society would see how important this exploration of the Northern Polar area must be, in connection with the expedition to the Antarctic seas; because, while the southern circle of open Polar water was sending out in every direction its deep outflow of glacial water, the land-locked Polar basin of the north possessed but few, and comparatively narrow, communications with the great oceans of the northern hemisphere. These phenomena were of great interest geologically, since there could be no doubt that the temperature and biological conditions of distant oceanic areas were influenced by the outflow of glacial water from the Polar Regions.

Mr. R. H. SCOTT, Director of the Meteorological Office, said he had recently received letters from Swedes and Germans, who had actually been on these expeditions; and it would be a satisfaction to Captain Osborn to know, that Captain Koldewey had arrived at the conclusion that an open Polar Sea did not exist. With regard to the Swedish expedition, Professor Nordenskiöld intended starting in the course of a few months with three officers and scientific men, and a crew of twenty. He proposed to start from the Seven Islands, a little to the east of Spitzbergen; and before the winter he hoped to reach Gillies Land by

the ice. But the main object of the expedition was to get to the Pole by means of reindeer-sledges.

Admiral OMMANNEY said, all Arctic navigators were not in favour of Smith South. He adhered to his former view, that the right direction to take was by way of Spitzbergen. It was sometimes difficult to reach Smith Sound, but they could always get to Spitzbergen.

The PRESIDENT said, the Council of the Society had appointed a Committee of the most experienced and practical members of their body, to report their opinions upon the subject; and they were unanimously in favour of Smith Sound. The Council, having discovered on a previous occasion that the whole matter broke down, through want of unanimity in the application to the Admiralty, thought they were now justified in proceeding, on the assumption that the Council were at any rate of one mind. When the time came, and the subject had been sufficiently ventilated, and public opinion pronounced in its favour, they purposed to go to the Admiralty with a direct proposal. Considering the enlightened views which had been expressed by the First Lord, and the Chancellor of the Exchequer, with regard to the Deep-sea Exploration, about to leave our shores in the course of the summer, he thought they had a right to anticipate a favourable consideration of their application, especially when it was supported by the professional approval of an officer so thoroughly competent to give an opinion as Admiral Richards. No one could have heard the stirring appeal of Captain Osborn, without seeing that, in a national point of view, independently of all scientific considerations, it was an object of great importance to keep up the high spirit of the navy. In these piping times of peace sailors and officers were apt to get rusty; and an expedition of this sort would have a good effect in rubbing them up, keeping the men up to their work, and stimulating the officers to that career of exertion, emulation, and competition, which was really the soul of the service. On that ground, and on the ground of the progress of geography and the acquisitions of science, he hoped the members of the Society would cordially support the Council in their application to the Government.

Eleventh Meeting, 13th May, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTTAION.—*Robert Reid, Esq.*

ELECTIONS.—*Edward William Barnett, Esq.; F. Le Breton Bedwell, Esq.; A. Bennie, Esq.; Major E. H. Finney; James George Henry Glass, Esq.; Colonel Gourley*, M.P.; *Colonel P. S. Lumsden*, C.S.I.; *George Samuel Measom, Esq.; George Henry Ray, Esq.*, M.D.; *William Shuter, Esq.; John Smale, Esq.* (Chief Justice, Hong Kong); *James Lewis Thomas, Esq.; Captain Henry R. Thuillier*, R.E.; *Charles Henry Wallroth, Esq.*

ACCESSIONS TO THE LIBRARY FROM APRIL 22ND TO MAY 13TH.—'Sir R. I. Murchison.' Von G. von Helmerson. St. Peters-

burg, 1871. Donor the author. 'Quedah, a Cruise in Japanese Waters.' By Captain Sherard Osborn, R.N. 1865. 'Stray Leaves from an Arctic Journal.' By Captain Sherard Osborn, R.N. 1865. 'The Discovery of a North-West Passage, by H.M.S. *Investigator*, 1850–54.' By Captain Sherard Osborn, R.N. 1865. Donor the author. 'The Martyrdom of Man.' By Winwood Reade. 1872. Donor the author. 'The Oxford and Cambridge Local Examination Record.' By E. S. de Carteret Bisson. 1872. Donor the author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING, APRIL 22ND.—A Map of the Southern part of Arabia from Aden, north-easterly, showing the routes of Messrs. H. v. Maltzan, Wrede, Munzinger, and Miles. Presented by Dr. A. Petermann. Karte der Zillerthaler Alpen. By Carl von Sonklar. Presented by Dr. A. Petermann. A Russian Geological Map of South Russia, North of the Sea of Azov. By B. Nossof, &c. Presented by H. Shirley, F.R.G.S. A Russian Map of European Russia and Finland, showing the River and Canal Communication. By the Russian Government. Presented by J. Pierce, Esq., F.R.G.S. Map of Routes from Leh to Yarkand and Kashgar. By R. B. Shaw, Esq., F.R.G.S. Presented by the author.

LIVINGSTONE SEARCH AND RELIEF EXPEDITION.

On taking the chair the PRESIDENT said, knowing that the interest felt with regard to the movements of Dr. Livingstone had been greatly increased by the recent telegrams, he regretted having nothing authentic to communicate to the Meeting. The Council of the Society had not received any definite detailed intelligence since the arrival of the last telegram. The mails appeared to have left Aden two or three days before the arrival of the *Abydos* at that port; consequently, another week must elapse before they obtained the letters which she brought from Zanzibar. In the mean time he had the satisfaction of stating that the opinion of the Council was generally favourable to the authenticity of the information received by telegram. They had every reason to expect that Dr. Livingstone and Mr. Stanley would meet about the beginning of the year, probably on Lake Tanganyika. But there was one point on which a little *éclaircissement* was desirable, because a belief seemed to prevail that Mr. Stanley had discovered and relieved Dr. Livingstone; whereas, without any disparagement to Mr. Stanley's energy, activity, and loyalty, if there had been any discovery and relief, it was Dr. Livingstone who had discovered and relieved Mr. Stanley. Dr. Livingstone, indeed, was in clover while Mr. Stanley was nearly destitute. By the last accounts, after Mr. Stanley had left Unyanyembe for Ujiji he was without supplies or attendants; whereas, the chief depôt of Dr. Livingstone's supplies being at the latter place, he would have had abundant stores wherewith to help Mr. Stanley. Therefore it was only proper that the relative position of the parties should be correctly stated. At the same time it was very creditable to Mr. Stanley to have performed the journey under such circumstances; and he trusted the expedition sent out by the Society would relieve both Dr. Livingstone and Mr. Stanley, and enable them to continue the researches upon which they were engaged. He fully expected that letters from Zanzibar would be received before the Anniversary Meeting. The Council of the Society had never given countenance, either verbally or

in writing, to the suspicion that Dr. Livingstone was no more. They had full confidence that he was still alive, relying on the fact that there had been no rumour to the contrary. Dr. Livingstone was so well-known, and so much interest was felt about him on the East Coast of Africa, that if anything untoward had happened, information of it would assuredly have reached the coast. The fact that no such intelligence had reached Zanzibar satisfied the Council as to his safety.

In reply to a question as to how, and from whence, intelligence came to Zanzibar, the PRESIDENT said he knew no more than what had appeared in the public papers. The telegrams were received by Mr. Pender and Sir James Anderson, the heads of the Telegraph Companies in England, from their agents at Aden, communicating the intelligence which they had obtained from the *Abydos*, on her arrival at Aden from Zanzibar. Dr. Kirk's intelligence would be contained in the despatches placed on board the *Abydos*, which would probably be transferred to the Government Mails, on the arrival of the vessel at Aden. It was only, indeed, by Dr. Kirk writing to some public officer at Aden to forward the intelligence by telegraph, that the Council could have received official information.

The Rev. HORACE WALLER said, although he fully concurred in what the President had said about Dr. Livingstone, sharing with him the idea that nothing untoward had caused the long silence, he nevertheless did not attach any importance to these telegrams. Dr. Kirk and Lieut. Dawson were at Zanzibar when the *Abydos* left. The captain of the *Abydos* was most interested about Livingstone, and all connected with him. If any news had reached Zanzibar, Dr. Kirk, knowing the *Abydos* was about to return through the Suez Canal, would not only have handed over despatches to be forwarded at the first opportunity, but also a telegram to be sent off when touching at Aden. He was sure the captain of the *Abydos* would have put himself to some trouble for that purpose. At all events, the telegram would have come from Suez. There was another remarkable thing connected with this matter—the captain of the *Abydos* did telegraph from Aden that there had been a cyclone at Zanzibar, which had destroyed all the shipping except his own vessel; and he was sure that, if there had been authentic intelligence concerning Dr. Livingstone, he would have forwarded it. His silence on the subject was rather ominous. His own impresssion was that, when the news came from Dr. Kirk, we should find that the foundation of the intelligence was one of those rumours which were always prevalent in the country; and of no more value than others which had often reached us to the same purport.

The following Papers were then read :—

1. *On the Position of Peïn, Charchand, Lob Nur, and other Places in Central Asia.* By ROBERT B. SHAW, Esq., F.R.G.S.

"MY DEAR SIR,

"In reply to your letter I now have the pleasure to send you a few notes on the subjects you mention.

"1st. With regard to Marco Polo's province and town of Peïn, identified by Colonel Yule with the Pima of the Chinese pilgrims, I can find no trace of either name in the recollections of the people, though I have had frequent opportunities of asking not only merchants who have visited Khotan and Kiria, but also natives of the latter place, and even a man who had lived for twelve years at Charchand. They all, however, agree that if ever there was such a

place, it must have been one of the cities swallowed up by the sand, of whose names even no recollection now remains. I enclose an itinerary from Kiria to Charchand and Lob, which accounts for all the country on the present route.

"But the remark made to me by an intelligent merchant may perhaps throw some light on the subject. He says that the route, on leaving Khotan, begins by going eastward to Kiria, but afterwards, making a wide sweep, the road ends by running nearly due north as it approaches Charchand. He adds that there should properly be a short cut across from Khotan to Charchand, but the barren and deep sands which occupy this line prevent men from attempting it. These are the sands which, advancing from the Takla Makân, are said to have engulfed so much fertile country. May we not suppose that in Marco Polo's time the road lay in this direction, passing through Peïn or Pima.

"The above information has two bearings. First, it gives us a probable locality for the vanished country of Peïn, on the direct line between Khotan and Charchand, where Marco places it, and at a place where the obliterating powers of the sand are known to have been exerted. Secondly, it corroborates Colonel Yule's suspicion (vol. i., p. 181) that Lake Lob should be placed much further to the westward than we find it in our maps; for the great curve in the road would make the absolute distance of Charchand to the east of Khotan (and of all places which are measured from it) much less than if the route were straight.

"As data for calculating the position of the mysterious Lake of Lob, I enclose statements of two several roads to Lob—one the northern *viâ* Aksu, and the other the southern *viâ* Khotan. For the distance by each of the roads I give two separate estimates, founded on different accounts. By taking the means of the latter we get a double indication (though a rough one) of the position of Lob.

"The position of Aksu is approximately known, being some 16 marches from Yarkand (say 220 miles in a direct line), and a little more from Kashghar. This is our first point of departure. Taking Mr. Johnson's determination of Khotan for our second starting-point, we have to make the two routes above mentioned meet at Lob. Allowing for the changes of direction which we know to exist, more especially in the southern route, we cannot place Lob further east than the 84th meridian (probably between that and the 83rd). Its probable latitude will appear to be between the 40th and the 41st parallels.

"This would leave plenty of room eastward for Marco Polo's thirty days to Shachau, which is too much if Lob is placed in the position

formerly assigned to it. As usual, all inquiry tends to verify the assertions of the great Venetian traveller.

"One of my informants, who lived twelve years at Charchand, says that the mountains are six days' distant from that place on the south and east, and are frequented by shepherds, hunters, and gold-seekers. He mentions a district, called 'Tokos Dewân' (= the nine Mountain-Passes), a fortnight's journey to the eastward, whence Kalmâks come to trade at Charchand, and through which a road leads to Lanchu, a large town on the high road to Pekin. These Kalmâks are probably what we should call Mongols.

"Another man relates a story of some gold-seekers who penetrated about 15 marches on a different line into the region on the east of Charchand, and, after crossing some mountainous country, came upon a considerable river of a red colour flowing towards the sun-rising, but were afraid to venture down it.

"Gold-seekers seem to play an important part in those regions; for I have lately heard of something resembling a Californian or Australian rush of diggers in the heart of Asia. There is a newly-found gold-field, named 'Kappa,' some 25 days eastward of Kiria, to which 1000 diggers have already flocked from all parts during the last year.

"Marco Polo is again curiously corroborated by the statement of a Khotan Hajji, that the precious jade-stone is found in the river of Charchand. This river runs into Lake Lob, and the road follows its banks, which are fairly inhabited. The Lob people are Mussulmans, but more uncivilized than their neighbours.

"Charchand and Lob Nur are, he says, in the great plains, but the mountains are not far off from the former place. Travellers from Kiria to Charchand, in clear weather, can distinguish hills in the distance on their right hand (S.E.). All my informants, however, agree that these mountains are what they call 'black,' or not covered with perpetual snow, though it lodges on them in winter. Thus the snowy Kuen-lun would seem to be dying out here, or at any rate to have retreated very far back, so as to be invisible from the plains.

"Judged by its productions, Charchand must be higher than Khotan; for rice and cotton do not grow there, while Indian corn, wheat, and apple and pear trees, are common. It is probably about the same height as Bora or Sanju, viz. from 5500 to 6500 feet roughly. Thus the mountainous country appears to descend very gradually in this direction, and to preserve its elevation much further north than it does in the neighbourhood of Khotan.

"From all the accounts taken together, I should gather that Charchand is not actually either in the plains or in the hills, but in one of those wide flats which may either be looked upon as a bay from

the plain running into the hills, or as a mountain valley opening out into the plain. Such also is the position of Sanju.

"I have thought that these particulars regarding Charchand would be interesting, as it has only lately been recovered by geography out of the haze of uncertainty, and identified with the province described by Marco Polo.

"One of my informants travelled back from Nia to Khotan with some Chinese officials, who, during the Mussulman uprising, had tried to escape to China by the Lob route, but had been captured at Karashahr by the victorious rebels and sent back under escort to Khotan. These officials evidently knew of no way eastward from Lob except by joining the regular northern route to Pekin; but it probably exists all the same.

"The most easterly places (not on the grand road) that I can hear of in these regions, are 'Zilm' or 'Zulm,' and 'Salâr' or 'Salarun,' both in the hands of the Tungânis, though the former is inhabited by 'Kalmâks.'

"Zilm is said to be 40 days from Kumul, and also an equal distance in point of time from Aksu and from Lhassa. It may possibly be identical with 'Sining,' a known place in Western China, but the nature of the productions brought thence would seem to argue otherwise. Pen-holders, carpets, and horse-trappings, said to be from Zilm, still reach Ladâk yearly, while the valuable fabric formerly known in that market as 'Siling' or 'Sling' has ceased coming for some years, owing to disturbances in those regions (probably the closing of the road by the Tungânis). If Zilm and Sining were identical, the more valuable manufacture would reach Ladâk as well as the coarser produce. Moreover, the distances do not agree at all.

"Salâr is reported, by different authorities, to be a month's march from Kumul, and to lie to the westward of Lanchu (a large town in Western China). The distance is not stated, but is probably not very great, as distances go in those regions.

"2. The subject of the lost city of Peïn leads to its sister mystery, the locality of *Bolor*. Though I have conversed with numerous traders and travellers who have frequented the roads from Eastern Turkistân into Badakhshân, and with Kirghiz tribesmen who have roamed over the Pamir with their flocks and herds, I have never met with one person who would acknowledge the existence of a town called *Bolor*, nor, indeed, of any place of that or a similar name to the *west* of the Pamir, as it is placed on some of our maps, and where the fictitious Ludwig von —— is said to have seen it. Nor is such a position reconcilable with Marco Polo's account, which places Bolor distinctly to the *eastward* of Pamir.

"An old Kirghiz of the Alaï horde, who knows every yard of the

country south of Kokand, even down to Chitrâl and Hunza, where he had several times gone to buy slaves, informed me that 'Palor' is the old name (sometimes used to this day) for the upper part of the Chitrâl Valley. If we suppose this name to have extended (as suggested by General Cunningham) north of the watershed, or, in other words, to have included the high country between the Chitrâl, Yassin, and Kanjut rivers on the south, and the Yarkand River on the north, all the requirements are fulfilled. Marco Polo is not usually so accurate in his bearings as to bind us to the exact direction E.N.E. from Pamir, when a point or two further south would correspond with other indications.

"The country above defined exactly answers to Marco's description of its natural features: 'Passing for a good 40 days over mountains and hills, or through valleys, and crossing many rivers and tracts of wilderness; and in all this way you find neither habitation of man nor any green thing.' This description is not very applicable to a town and its neighbourhood. Probably in no direction could a 40 days' journey through mountainous wilderness be taken from the Pamir, unless the traveller crossed into the Taghdumbash (the head of Sarikol Province), and thence over the Kandar and Arpatallak Mountains, and up the Yârkand River through Shingshal to the Dubla Sertkol Desert, &c. Certainly such a journey could not be taken between Pamir and Kashghar, which is a distance of not more than 12 or 14 marches.

"It is not necessary to include Baltistân in this definition. Its position and natural features separate it off.

"The region I have indicated corresponds with that described by Hwen Tsang as being to the south of Pamir (particularly that part of it where the ancient name still lingers). With this agrees also the Tarikh Rashidi (quoted by Colonel Yule), which states that *Malaur* (Palor) is bounded on the east by Kâshghar and Yârkand, on the north by Badakhshân, on the west by Kâbul, and on the south by Cashmir. Such a definition plainly excludes anything to the north of Badakhshân, though it also indicates a very considerable extension on the south (unless by Kashmir we are to understand its present outlying provinces of Gilgit and Baltistân).

"Finally, the Pushtu poem (also quoted by Colonel Yule) places *Bilaur* on the north boundary of Swat, which would precisely correspond with the position of Upper Chitrâl, which, as I have mentioned, is said still to bear the old name of Palor.

"I am not aware what weight should be given to the Chinese tables, which would seem to be almost the only contradicting authority."

COMPARATIVE TABLE OF ROUTES TO LOB-NUR.

AKSU to LOB.

Routes.	Names of Halting Places.	Absolute Distance in Miles.
1st. Route (given by Hajji Yusuf of Yarkand). [See Route annexed].	Aksu to Karashahr: 17 marches (taking 20 miles as the average day's march by road, and deducting one-third for windings) =	227
	Karashahr to Lob: 2 marches (ditto) .. =	27
		254
2nd Route (given by Mahmood Jân, Afghân trader).	Aksu to Kurla: 80 *tash* (taking 1 *tash* at 5 miles, and deducting one-third for windings) .. .. =	267
	Kurla to Lob (say) 2 days (as above) .. =	27
		294

KHOTAN to LOB.

Routes.	Names of Halting Places.	Absolute Distance in Miles.
1st Route (given by Rozi, a native of Khotan, who lived twelve years at Charchand). [See Route annexed].	Khotan to Kiria: 6 marches (calculated as above) .. .. =	80
	Kiria to Charchand: 16 marches (ditto) =	213
	Charchand to Lob: 6 marches (ditto) .. =	80
	.. ..	373
2nd Route (given by Mahmood Jân).	Khotan to Lob: (the Khotan Hakim's camp is said to have taken thirty-five days, *marching slowly* from Kurla to Khotan *viâ* Charchand: deduct 3 such marches from Kurla to Lob; there remain 32 marches of, say, 18 miles each. Deducting one-third for windings, as above) .. .. .. =	384

EASTERN ROUTE to KHOTAN.

Number of Marches.	Names of Halting Places.	Distance in Kacha Kos.	Remarks.
	No	..	A hamlet on the Pangong Lake (east side).
1	La-rung .. .. (pass) (narrow).	15	Road up a nullah. No cultivation; sometimes a camp of Champa (Tibetan nomads). Grass and wood.
2	Sum-ziling .. .. .. (three) (valleys).	15	Grass and wood. *Ovis ammon* and *antelope*.
3	Dung-lung Tak-nakpo .. (wild yak) (valley) (mtn.) (black).	18	Grass and wood.

EASTERN ROUTE to KHOTAN—*continued.*

Number of Marches.	Names of Halting Places.	Distance in Kacha Kos.	REMARKS.
4	Tsa-ga .. .. (salt) (place).	14	Grass and wood. A salt lake 3 miles long.
5	Tang-mar Kang-ri .. .. (plain) (red) (ice) (mountain).	16	A little grass. Antelopes. A pool of sweet water. Cross an easy ridge on the road.
6	La Kankial .. .. .. (mn.) (descent).	12	A little grass and fuel. A pool.
7	Tso-kante .. .. (pool) (bitter).	11	Grass and fuel. Dig for drinking-water. Remains of an old prayer-inclosure (Mussulman), also marks of cattle and sheep-pens. Supposed to be due to Hor (Turki) shepherds.
8	La-chu-lung Sumdo .. (mtn.) (water) (valley) (3-fold junct.)	11	Grass and fuel. Antelopes.
9	Kang-lung Ding-rol .. (ice) (valley) (ascent) (descent).	20	Ascend to a high level, passing a lake; then follow down a stream of water. Perpetual snow close by.
10	Baba Hatim	3	An old ruin, on banks of same stream as above, which is scarcely fordable, and runs to the East. Grass and fuel. Thence cross a pass (less than Chang-la, 17,800) and get into a narrow valley, with a stream running in a northerly direction.
11	Aksu Lungpa .. .. .. (white water, Turki) (valley, Tib).	12	Camp on stream. Grass and fuel. Then road leaves stream to its right.
12	Tang-nakpo .. .. .. (plain) (black).	12	Appearance as if strewn with ashes. Sulphur mines. Grass and fuel. Then cross the plain and enter a difficult nullah.
13	Pur-lung .. .. (through) (gorge).	17	Grass and no wood. Pass a "langar" (rest-house) half way, and, continuing down the same difficult nullah, reach
14	Pulu	12	Pulu, a very warm place; all kinds of fruit produced. Snow Range visible on south over the nearer hills. Pulu is in a depression whence you rise on to a plain covered with low hills which takes you to Khotan.
15	Ganju	18	400 houses.
16	Imâm-Ullah	18	Ditto.
17	Langar	18	A single house in a plain.
18	Khotan (Ilchi)	18	A city a little smaller than Srinagar (Kashmir).
	Kacha kos	260 =	About 390 miles by road.

N.B. This road is very seldom traversed. The names are those given to the different stages by the Tibetans, who have travelled that way.

KHOTAN to LOB.

Route given by ROZI of Khotan, who lived at Charchand for twelve years. About 380 miles (exclusive of windings).

Number of Marches.	Names of Halting Places.	REMARKS.
	Khotan (Ilchi) 6 marches to	
6	Kiria	Small town near the gold-fields.
7	Oïtoghrak	A few houses.
8	Yashil-yurghun ..	A *langar* or rest-house.
9	Takhtaban	Desert.
10	Nia	A town.
11	Baliklik	A pasture.
12	Yertongus	Desert.
13	Haïdilshah	Desert—salt pools.
14	Akbai	Salt pools.
15	Paka	Ditto.
16	Akmurân	A small stream.
17	Kalasde	Salt pool.
18	Yantag kuduk ..	Ditto.
19	Kukmurân	Ditto.
20	Islam-langar	
21	Yang-arik	
22	Charchand	A small town and district extending on both sides of a stream which flows to Lob, producing *jade*; inhabited by Mussulmans. Produce wheat, Indian corn, &c.; *no* cotton or rice. Road chiefly along banks of river, partially inhabited.
	6 marches to (one authority makes it only 4)	
28	Lob .. .. (thence to Karashahr on the northern road is 2 marches).	A lake and habitations. People Mussulmans, but very uncivilized.

ROUTE from YARKAND to PEKING.

From a written Itinerary made by YUSUF HAJJI before the Mussulman Rebellion.

Number of Marches.	Names of Halting Places.	REMARKS.
	Yarkand to	
1	Ajartaku	Large village, 500 houses, a bazâr.
2	Lalilik	Ditto 200 houses, in a jungle.
3	Rahmat	Ditto.
4	Ala-aghir	Village in jungle.
5	Aksak-marâl	On the banks of the Yarkand River. The road is here sometimes closed by floods, when travellers go through the jungle.

ROUTE from YARKAND to PEKING—*continued.*

Number of Marches.	Names of Halting Places.	REMARKS.
6	Shamâl (= "wind" T.)	A village—windy spot.
7	Marâl-Bashi	A town founded by the Chinese. Fertile country (wheat, &c.), irrigated from the Kâshghar River. In the hills to the west is a mine of salt, like the Panjab salt.
8	Chahr Bagh	Village, 200 houses.
9	Tumshak	Ditto do.
10	Kuduk (= "well" T.)	Ditto
11	Châdir (= "tent" T.)	Ditto.
12	Süt (= "basket" T.)	Ditto.
13	Chilân (a fruit)	Ditto.
14	Yaka-kuduk (= "well" T.).	Ditto, with a well.
15	Si-arik (arik = "canal").	
16	Kumbash (= sand-head)	Village. Cross a river (Kashgar?), less than Yarkand River; fordable except in summer.
17	Aksu	A town with 6000 houses. Two divisions; one Mussulman, the other (formerly) Kataï. The Aksu River is close to the walls of the former on the south side; often floods the town. In mountains to north are copper-mines. The Chinese used to coin the produce here.
18	Jâm	A hamlet of 50 or 60 houses.
19	Kara-yulghun .. .. (black) (a tree).	Many trees.
20	Yak-arik .. .. .. (side) (canal).	
21	Unbash	
22	Baï	Small town, 500 houses.
23	Kizil = red)	Village, 50 houses, soil red (iron?). After 4 or 5 miles cross the River Shaldung (flowing from the north, and turning towards the east) from the mountains south of Ila. Small river. Then cross a hill.
24	Kuchâr	A large town. Chief city of the districts of Aksu, Ush-Turfân, Baï, Sahrâm, Bigur, and Kurla. Celebrated for fruit and handsome women. Mines of "phatkari," and sulphur and salt.
25	Tukan	Village, 100 houses.
26	Aïd	Ditto.
27	Châdir	Ditto.
28	Bigur	Small town. Inhabitants Turks.
22	Yang-hissar	A ruined fort. Cultivation.
30	Charchi	Village.
31	Kara-su	Much rice grown here.
32	Kurla	Small town. Turks.
33	Shorchuk	Soil incrusted with soda. A large river, crossed at all seasons by boats.

ROUTE from YARKAND to PEKING—*continued.*

Number of Marches.	Names of Halting Places.	Remarks.
34	Karashahr	Inhabited by Kalmâks, whose ruler is a woman. Country to south, as well as north, inhabited by nomads of the same tribe. Buddhists. They are rich in flocks and herds, of sheep, cattle, camels, &c. Mountains and forests near; much game.
35	Tablaghu	Village, 50 houses.
36	Ushaktâl	Many small trees. Village.
37	Karakil	Village, 50 houses.
38	Kumush Ak	
39	Uchma	A windy desert.
40	Ighar Bulak	A spring.
41	Subashi	Village.
42	Tuksun	Small town.
43	Yughun	Village.
44	Turfân	Large town. Mussulman inhabitants. Coal mines and sulphur found in the neighbourhood.
45	Sangin	Village.
46	Lamchin	Ditto.
47	Pachân or Pijân ..	A town.
48	Baka	No village—a swamp (?)
49	Chiktum	Village.
50	Yanchi	Ditto.
51	Kösh	Ditto.
52		
53	Utun-kuz	Ditto.
54	Ludun	Ditto.
55	Chakda	Ditto.
56	Tughach	Ditto.
57	Sumbal	Ditto.
58	Kumul or Hami ..	The last 9 marches belong to Kumul. Double town, of which half is inhabited by Mussulmans. Formerly only subjects of China were admitted here.
	7 marches to	
65	Shing-shing	
66	Kang	Village, road level; inhabitants Karakatai (Chinese).
67	Khekupu	Small town, inhabited by Kara Kataï, and also by Mussulman Tunganis.
68	Andesha	Large town. 2000 Chinese troops (before 1863).
69	Yuman	Large town. 1000 troops (before 1863).
70	Sa-chang	Small town.
71	Shang-ching-za	Police station. Passports examined.
72	(Chinese Frontier) .. (Ja-i-band).	A gate-way in the Great Wall. Bazârs within and without. The wall is here of stone and of brick, 12 yards high. 1000 troops stationed here (half within the gate and half without). The wall joins two hills. Passports examined for both directions.

ROUTE from YARKAND to PEKING—*continued.*

Number of Marches.	Names of Halting Places.	Remarks.
18 Marches	Suchu	Large town. 8000 troops.
	Kotipu	Ditto 3000 do.
	Sachu	Ditto 2000 do.
	Languchu	Ditto 5000 do.
		Cross large river.
	Kanchu	Large town.
	Lanchu	Ditto A viceroy, who affects the state of a king. 20,000 troops.
		To the west of Lanchu lies Salâr, a large town of the Tungani Mussulmans, the capital of eight other towns.
	Zoj	Town with 600 soldiers.
		Cross a mountain.
	Ching-chu	Town with 500 soldiers.
	Ching-ku	Ditto 1000 do.
	Andishan (? Aleshan)	Ditto 1000 do.
	Shig-koyan	Small town with 500 soldiers.
	Koen-shan	Large town with 3000 do.
	Ching-shal	Town with 1000 do.
	Hi-ku-ja	Small town with 500 do.
	Lingu-du-shan	Large town with 2000 do.
	Wat-ku-pa	Small town with 1000 do.
		Cross high mountain with large and rich pagoda.
	Chansi	
	Pang-lang-ku	Large town with 2000 soldiers.
	Bi-shen-chu	Small town with 200 do.
	Chin-chu	Ditto 300 do.
	Aya-za	Ditto 200 do.
	Cha-lung	Ditto 300 do.
	Be-gu-ji	Large town, magazine, and arsenal.
	Yang-shu	Ditto 1000 soldiers.
	Ching-chu	Ditto 5000 do.
	Li-chen-chu	Ditto 4000 do.
	Shen-yang-shen	Ditto 2000 do.
	10 marches to	
	Po-shian	
	Siampu	A viceroy, with 30,000 soldiers.
	Langku-mang-san ..	Town 1,000 do.
	Uman-san	Ditto 500 do.
	Ju-ju-jing	Ditto 1,000 do.
	Tunugun jing	Ditto 2,000 do.
	Sujing	Large town 1,000 do.
	Barmajan baldur ..	Ditto. 15,000 do.
	Panchurin	Small town; no troops.
	Shang-chin	Ditto do.
	Unmanshan	Large town with 2000 soldiers.
	Homi	Ditto 2000 do.
	Si-shung	Ditto 1000 do.
	Pi-ying-ku	Ditto 2000 do.
	Khung-no-shan	Ditto 2000 do.
	Ching-chin-shan ..	Ditto 1000 do.
	Khoju	Town 2000 soldiers.
	Rin-ku	No troops.

ROUTE from YARKAND to PEKING—*continued.*

Number of Marches.	Names of Halting Places.	Remarks.
	Lingu-shan-shan ..	1000 troops.
	Chi-chi-shu	No troops.
	Ti-ku-shan	Ditto.
	Ji-pu-shan	1000 soldiers.
	Shu-ku-shan	500 do.
	Wang-wu-kra-lu-ki-wun	No troops.
	Shu-ing-shan	1000 soldiers.
	Le-shi	None.
	Pangar-chu-chun ..	2000 soldiers.
	Bi-chi-yun	500 do.
	Chingarshun	1000 do.
	Khi-lash	1000 do.
	Wang-pu-chun	1000 do.
	Khu-chin-san	1000 do.
	Lu-shan	1000 do.
	Bar-wu-chun	2000 do.
	Wang-lung-shan ..	1000 do.
	Bar-man-chu	
	Chang-mang-ku ..	
	Li-nang-pu	1000 do.
	Anshu	A district.
	Bagshu	
	Ju-ju	Large town with 2000 soldiers.
	Lang-ku-shan	Ditto do. (Passports examined).
	Bajin	The city of Peking (from the frontier 91 marches).

2. *A Havildar's Journey through Chitral to Faizabad in* 1870. By Major T. G. MONTGOMERIE, R.E., F.R.G.S., Officiating Superintendent G. T. Survey of India, in charge of the Trans-Himalayan Exploring Parties.

[EXTRACTS.]

THE Trans-Himalayan and Trans-Frontier explorations were carried on during 1870 in various directions, in continuation of my general plan for systematically exploring all unknown or partially unknown countries beyond the British Frontier. One line of exploration from Peshawur direct to Faizabad, the capital of Badakshan, was brought to a successful conclusion, and will now be reported on.

I have long wished to clear up the geography of the mountainous tract lying between Caubul and Little Tibet which is bounded on the south by the Indus River and its great Caubul tributary, and on the north by the Hindoo-Koosh and Mustagh ranges. Though

draining into our territory, and though we have several routes actually going into it near Peshawur and again near Gilgit, our progress in clearing up the geography of this very difficult tract has hitherto been very slow, reliable work indeed, extending but a very little way beyond the border. This being the state of the case, it appeared to me that if a Route Survey could be carried right through the heart of the country, I should be able to get the correct positions of the larger places, and should, at the same time, be able to string together a large amount of detailed information which I have collected as to the minor tracts, valleys, &c., of the country, so as to form a fairly reliable map of the whole. With this object in view, I made various attempts to get a suitable agent from near the Peshawur frontier, and was fortunate enough to have a Pathan Sapper placed at my disposal, who was in every way qualified for the work. He was consequently carefully trained, and, after several preliminary trials, was started on an exploring expedition, with instructions to carry a Route Survey from Peshawur, through Swat and Chitral, to Badakshan.

Starting from Peshawur on the 12th of August, the party crossed into Swat by the Malakund Pass on a range which rises into peaks of 6000 to 7000 feet; reaching on the 15th, Alladand, the capital of the present ruler of Swat, a small, poorly built town of 300 houses. The next day, at a mile and a half north of Alladand, they reached the Swat River, a very large stream, which they crossed on rafts: continuing their march, the same day they ascended the opposite mountains, and by an easy pass crossed over the Lurrum Mountains into the Talash district, and descending to the Punjkora River, crossed it on the 17th; this river appeared to be even larger than the Swat River. From the Punjkora River they marched on through Jundul, the largest district of Bajaur, reaching, on the 18th August, Miankilai, the chief town of Jundul, and the capital, in fact, of the province. Thence passing into the Dir district, they arrived on the 23rd of August at Dir itself, which the Sapper reports as being a small town of about 400 houses.

So far the Sapper had made his way as an ordinary traveller; but from Dir to Chitral the road is infested by Kafirs, and it was consequently necessary to make some other arrangements, in order to have a chance of a safe transit across this dangerous tract. Traders are in the habit of halting at Dir or Chitral until a large number collect, in order that they may all start together. Sometimes as many as 200 start at the same time; but, in spite of this and other precautions, the travellers are frequently attacked by the Kafirs, and many are killed. Those of the travellers who fall are buried

by the side of the road, mounds surmounted by a flag marking their graves: these are called the tombs of the martyrs. The Sapper saw hundreds of these, anything but reassuring, memorials on the way between Dir and Chitral.

On arriving at Dir they were much disappointed to find that all the traders for the northern route had already left, and that there was nothing for it but to make a special arrangement for their party by itself. In this dilemma, the Sapper presented himself before Ramatoolah Khan, the chief of Dir, and asked for assistance. Ramatoolah Khan questioned him as to the object of his journey, &c., and was fortunately satisfied with the answers he got.

The Sapper then placed a handsome gold-laced scarf by the chief and pointing out that as all the traders had already started, it would be simple madness for his small party to go by itself, he begged that the chief would kindly send an escort with them; after some hesitation the chief consented, and gave the necessary orders. The party accordingly resumed its march, and, on reaching the village of Kashgarai, found an escort of 25 armed men awaiting them. The next day they reached Gujor, and then crossing the Lahori Pass, close to mountains of 14,000 feet and upwards, they, after a very trying march, reached the village of Ashreth. Here, in spite of their escort, they were much troubled by the Kafirs, who swarm in and about the village; the inhabitants pampering them, so as to escape being more openly plundered. During the night, an incessant discharge of small arms was kept up on the Sapper's party, who returned the fire, but, owing to the darkness, there was no damage done on either side, as far as was known. The next day they resumed their march, being glad to get safely out of Ashreth. Their escort accompanied them down to the Koonur River, and finally parted from them at the village of Galatak, in the Chitral district, where an escort was no longer necessary. From thence they made their way up the Koonur River to Chitral, crossing one very large tributary called the Shushidurra, which joins in on the left or eastern bank. On the road near Brary, on the 30th August, the Sapper first heard a report of the murder of poor Mr. Hayward. The report was, that a saheb by name "Hawel," who had travelled from Kashmir to Chitral, and whose intention was to have gone thence into Badakshan, had been murdered at a place called Ooshgoom, (distant about seven days' journey north-east of Chitral), by the order of Mir Walli of Ooshgoom, son of the late Goraman of Yassin. The saheb was said to have been accompanied by eight servants, one of whom alone escaped, though not without some wounds, the other seven being all killed. After the saheb was murdered, some 700

tillahs, or gold pieces (about 6 rupees each in value) were found and taken by the murderers, along with his clothes, guns, pistols, his watch, books, and a variety of other property.

On the 31st of August the party reached Chitral, where their first transaction with the Chitral chief was an attempt on his part, through his Wazir, to make them exchange a portion of their goods at his valuation. The Sapper had an interview the next day with the chief, who is styled Badshah by the people thereabouts, but it was to no purpose; so there was nothing for it but to submit to the imposition.

Starting from Chitral on the 5th of September, they continued their journey to the north. Leaving the main Koonur River on their right, and ascending a large side stream, they, after some delay, reached the base of the lofty Nuksan Mountain by noon on the 15th of September, and the same afternoon accomplished about half the ascent. The climate was very trying, partly on account of the steepness and partly on account of the snow. Their camp was, of course, a most uncomfortable one; but they were not able to enjoy long, such small comfort as was to be got there, for it was necessary to be off by 3 o'clock the next morning, so as to clear the pass before the Kafirs met them—the road near the pass being dangerous, owing to strong bands of those robbers who are always on the look out for the chance of plunder. After a very stiff climb the party reached the crest of the pass, crossing large beds of snow and immense masses of ice; the road for a distance of 400 or 500 paces being literally cut through the ice to a depth of from 6 to as much as 12 feet. Every here and there the ice was fissured with vast cracks, which the travellers avoided with the greatest care.

The Sapper had never been on any snowy mountains before; but this account leaves no doubt in my mind that this part of the so-called Hindoo-Koosh range, at any rate, boasts of one glacier, the vast cracks, or in other words the crevasses, being quite unmistakable, as they never occur in an ordinary snow-bed. As the mountains on either side of the pass rise considerably above it, the probability is that there are numerous glaciers in the neighbourhood. The above is the first evidence that we have as to there being any glaciers in the Hindoo-Koosh; nothing of the kind having been noted between Bamian and Pamir Kul, the most easterly point visited by the Mirza.

Having crossed the pass they descended rapidly, and, after a very hard march, reached Daigul, the first village of Badakshan, and on the 18th September made their way to Zebak, on the Kokcha River, the same group of villages that the Mirza passed through in the

previous year, thus completing a junction and connecting the two Route Surveys together. From Zebak they went down the Kokcha River, by much the same route that the Mirza ascended, reaching Faizabad, the capital of Badakshan, on the 25th of September.

The Sapper found that Jehandar Shah, the Mir or ruler who held Badakshan when the Mirza was there, had been supplanted by Mahmood Shah, who was assisted by the Amir of Caubul. The party had instructions to advance still farther north across the Oxus, and they tried to arrange for so doing, but could not, because the road in that direction was strictly closed by the orders of the Amir Sher Ali, who suspected that letters were sent by that route to Abdul Rahman Khan, by his supporters in Caubul.

Whilst in Faizabad, the Havildar witnessed the fate of a man upon whom some such letters were found. The unfortunate wretch was thrown from a lofty bridge down into the rapid stream of the Kokcha, and, though not killed on the spot, he died a few days afterwards from injuries received by being dashed against the boulders which protrude from the water in every direction. This is a favourite mode of execution in Badakshan, and was noted by Wood when he passed through the country.

Being able to devise no immediate means of advancing to the north, the Sapper, according to his instructions, prepared to return. Starting on the 27th of October, his party reached Zebak on the 31st of October, where they witnessed a meeting between the rulers of Badakshan and Chitral. On the 3rd of November they left, with a party of traders accompanying Mir Walli, the murderer of Mr. Hayward, who had come into Zebak with the Chitral chief. Whilst there the scoundrel Mir Walli had his leg broken between the knee and the ankle by the kick of a horse, and when the Sapper saw him was in great pain with it, the bone never having been allowed to set.

From Zebak it was necessary for the party to take a different route from that by which they crossed the Hindoo-Koosh on their upward journey—the lofty Nuksan Pass being already closed, owing to the lateness of the season. The traders said the only chance was to try the Dora Pass to the west, which was somewhat less difficult, though less used, owing to its running through a part of Kafiristan and to its consequently being always infested by strong bands of Kafirs. The traders, however, having Mir Walli's escort and being in considerable numbers themselves, thought they might risk the passage; they therefore marched on, taking the more westerly of the two streams, which, coming from the south, join at Zebak. The first day they reached Sanglech, where the cold was so intense (though

it was only the 3rd of November) that the stream which flows past that village in a steep bed was already frozen hard. The next day they advanced to another village, also called Sanglech, and here two of the Sapper's servants deserted, being afraid to face the intense cold expected on the Dora Pass; the Sapper, however, resolved to go on with his diminished party. On the 5th they encamped in a desolate place at the foot of the Dora Pass; here they had to be very vigilant, so as not to be surprised by the Kafirs, who are thereabouts more especially troublesome. By good arrangements they escaped an attack, and the next day they succeeded in crossing the Dora Pass, the road appearing to the Sapper to be even worse than the Nuksan Pass; this he thinks was in part due to the lateness of the season. He says he never in his life experienced such hardship as he did on those two stages. The combined effect of the intense cold, the high cutting wind that prevailed, the fact of being deserted by two servants, and the anxiety owing to threatened attacks by the Kafirs, made them feel the height of misery, the more especially as from the 6th, when they passed the crest of the Dora Pass, till the 7th of November, when they reached Lotko, in the Chitral province, it was snowing hard. From thence they marched on to Shogoth, thus joining in to their former route. The Chitral chief caught them up and passed them on the way, and thinking he had a good opportunity, he ordered an extra toll to be taken from the traders; they, however, refused to leave Shogoth, and held out there six days, till they at last got better terms. The Sapper, with them, reached Chitral on the 16th of November; on the 17th he again presented himself to the Badshah, who now, however, looked coldly on him, saying that he had heard he was in the employ of the English. The Sapper, however, was nothing daunted, and requested that he might have a pass for his return: the chief, though convinced he had heard a true account as to the Sapper, thought it as well not to interfere with him and his party, and so gave the necessary order. The Sapper said when he left, Mir Walli was still in great agony from his broken leg, and as he could actually hear the bone grating when he moved, and it was then more than a month since it was fractured, there is little doubt but that this scoundrel may hereafter be recognised by his lameness, which is likely to be permanent, and which may yet perhaps assist in bringing him to justice and to the fate he so richly deserves.

Having completed his arrangements, the Sapper marched back by much the same route as he had advanced, reaching Peshawur on the 13th of December, having again passed safely through the corner of Kafiristan, between Chitral and Dir, and not a little glad to think

that neither he nor any of his men had added another mound to the tombs of the many Mahomedan martyrs who have fallen on that road.

His Route Survey is 286 miles in length, over entirely new ground which has never before been surveyed by an explorer, though, no doubt, other natives may have passed over the whole length. The route touches upon a great number of districts, and determines, with all desirable accuracy, a number of important places. It accounts for the geography of about 13,000 square miles of this *terra incognita*, and will aid in unravelling the geography of a still greater area. The route is checked by 20 latitude observations at five places. The boiling-point observations are very meagre—the Sapper not quite appreciating their importance, this being his first expedition. He moreover says he wished to boil on the passes, but was unable to do so without risk of detection, except on the Nuksan Pass, where, unfortunately, he could find no wood, being far above the limits of forests. From the glacier and the amount of snow in September, as well as other evidence, I conclude the Nuksan Pass to be above 17,000 feet; that of Dora may be 16,000 to 16,500.

The position of Chitral has always been a great desideratum, and, as it is so immediately north of Peshawur, it may be concluded that it has been very satisfactorily determined, as any error in the distances could but very slightly affect its longitude, while its latitude is thoroughly established by three astronomical observations, which agree very fairly *inter se;* the Sapper having shown by his observations for Peshawur and for Faizabad that he understands taking latitudes—those at the latter place agreeing very closely with Wood and the Mirza.

Altogether the Sapper's work has satisfactorily stood the tests applied; he has moreover fixed a number of peaks by bearings, and though mostly rather close to his route, they will aid in solving the geography of the surrounding mountains.

In my opinion, the Sapper deserves all credit for his great pluck and endurance as well as for the discretion with which he penetrated through such a difficult country, without, I believe, getting into a single disturbance with the people of any of the districts he traversed, though constantly bullied by requests for legal and illegal tolls which were made at most places. I am convinced, moreover, that his undaunted bearing on his return journey, when the chief had guessed his secret, was the means of preventing himself and party from being sold into slavery, or possibly from a worse fate; the wily chief probably thinking that his co-religionist who showed such a bold front did so because he was backed by something more than the few men he had with him.

Colonel J. T. WALKER, R.E., said the advantages of these explorations consisted in their furnishing portions of a framework within which all the different physical features of the country would be subsequently fitted. This was the great desideratum in Central Asian geography. The red lines prominently marked on the great map of Central Asia which was exhibited to the Meeting, indicated the course of these explorations, so far as they had been carried out hitherto; and it would be noticed that from the River Indus and the north-western frontier of the territory subject to the Maharajah of Cashmere—which had been regularly surveyed by British officers—up to the vicinity of the mountain passes above Caubul, there was but one continuous route survey through the regions on the south of the Hindoo-Koosh range, namely that now furnished by the Havildar in the course of his explorations; for the unfortunate Mr. Hayward had only penetrated a short distance into this country when he was murdered. Hitherto, although we have had numerous descriptions of the geography of portions of the country, we have had no means of fitting the details together. We had also determined a number of trigonometrical points on the hill ranges in this country, but these points were all fixed at such great distances from the stations of observation that it was impossible to identify them or ascertain the localities to which they appertained. Intervening ranges cutting them off from view at the nearest points of British territory, it became necessary to descend to the southern part of the Peshawur Valley to find stations whence they could be observed, though at distances of 60 to 100 miles. Thus, though we possessed accurate determinations of the positions and heights of a great number of mountain peaks, yet they were insufficient for the basis of a map, until we were able to send some one into the country to explore it, and to fix the positions of important points—as, for instance, Chitral—with reference to the mountains which had been trigonometrically fixed: when this combination of work was done, a fairly accurate map might be produced, and every additional route survey would add precision to our geographical information, as well as increase its amount. To get men to make these explorations was a very difficult task. We began with the well-known Pundits, who had since retired from the work; then we had the Mirza, and he had given it up; and lastly we have had the Havildar Pathan, and probably we should hear nothing more of him. After receiving a good reward, these men liked to go to their homes, and live in peace for the rest of their lives. The consequence was that exploring went on very slowly. We have to get a fresh man each time, and train him for the work,—and this occupied some considerable time; and some of those trained were found eventually to be unfit for the work, and had to be got rid of. The Havildar's determination of the height of Chitral as only a little over 7000 feet was a remarkable fact in the physical geography of this region. Considering that the only peaks in the Hindoo-Koosh range whose heights have been determined hitherto are from 22,000 to 28,000 feet high, the fact that Chitral, though situated within a short distance of the range, is only 7000 feet high, is very remarkable, and at first seemed very questionable, until it was noticed that Mr. Hayward had found Yassin—which is situated at nearly the same distance from the watershed of the Hindoo-Koosh—to be only 7700 feet high. It seems probable, therefore, that in this portion of the range the watershed is considerably depressed. As our knowledge of the geography of this country improved, we should probably find that the system of mountain chains, as represented in our maps, would require great alteration; that the dark range now representing the watershed would be found much lower than is now supposed, and that the higher ranges were to the south of it.

The PRESIDENT said it was a new idea to him that the outer range of the watershed should be lower than the inner range. He had always been under the impression that the watershed between the Oxus and the Indus was the

culminating ridge. He saw that several points just within the Dora Pass had been trigonometrically fixed at 16,500 feet.

Colonel WALKER said that these points were on an outer range, not on the main watershed, which was hidden from view by the outer range, so that it had not been possible to fix any trigonometrical points on this portion of the watershed.

The PRESIDENT said there was no doubt that the great range, which we called the Indian Caucasus, decreased in height as it stretched to the westward. The mountains north of Cabúl were not so high as those to the north of Chitrál. It was quite possible that the crest which the Havildar traversed might be lower than that further south. Still it was a point he should like to have verified: because glaciers certainly did exist on that watershed, the Chitrál River itself coming out of a glacier. Geographers, indeed, would remember that Macartney, sixty years ago, laid down a glacier on the north side of the range, from which the head-waters of the Oxus flowed; but he (the President) had never heard of glaciers south of Chitrál. The Havildar's journey was exceedingly important, because he was the first man who had determined the position of the Chitrál Valley astronomically. He seemed indeed to be a most remarkable man. Major Montgomerie, in a private letter to him (the President) had mentioned that the Havildar, on his return-journey, went into the presence of Amán-el-Múlk and Mir Walí, convinced that he would never come out alive; but he kept his hand on a loaded revolver in his pocket throughout the interview, with the full determination, should a signal be given to seize him, to despatch both of these redoubtable chiefs before yielding. He had presence of mind, however, to carry on the conversation with perfect calmness, and was ultimately allowed to come out in safety. He (the President) only hoped the Havildar would not retire from the work of surveying. He was pleased to hear that Major Montgomerie was training up other native explorers in the same field; for we looked to them, and to them only, to clear up those geographical problems that were still perplexing us beyond our frontiers, in regions that were inaccessible to British officers. Before closing his remarks, he wished to call attention to the gradual approach of Russia to the northernmost frontiers of India. They were now in possession of the province of Dzungaria, holding it vicariously for the Chinese, who, however, he should think, were not likely very soon to resume the occupation of their territory. At the same time, the Russians were doing good service, geographically, by extending our knowledge of Central Asia. Their frontier, at one point near Artúsh, was within 300 miles of the extreme limit determined by Colonel Walker's survey. So that it was possible, in fact probable, that, in a short time, triangulation would be carried across the interval; in which case we should have a continuous series of triangles from Cape Comorin to Siberia, across the entire continent of Asia.

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3. *Route from Shiraz to Bam.* By MAJOR B. LOVETT, R.E.

[EXTRACTS.]

THERE are several roads that run between Shiraz and Kerman. The road I took leaves the Shiraz Valley to the north-east, passing by the Bagh-i-Dilkhusha and Saadi's tomb; and as far as the town of Niriz, is a very fair road, so that carts could proceed along it without the slightest difficulty. After arriving at Dodeh, our first stage, I found the road to Niriz lay in the Persepolis Valley, as

I shall call it for the sake of distinction, as the famed ruins are situated in it. In this valley is situated the famous salt lake known as the "Deria Numuk," and generally designated in the published maps as Lake Bakhtagan; why, I know not, as the inhabitants of its southern shore do not even recognise it by that name. When I passed by, the lake was quite dry, but its usual limits were well defined by a wide expanse of saline deposit. The axis of the lake, so to speak, partakes of the parallelism of the valleys and chains of mountains adjacent; and these, in all hitherto published maps of Persia, incline insufficiently to the south. I observed, to the south of the hills forming the southern boundary of the Persepolis Valley, that there existed a lofty snow-capped range running parallel with it. This lay between the valley of Rohniz and that of Fesa, but is not the "Khushnagan" hills of the maps, which are a distinct range nearer to Shiraz. The position of Niriz ascertained on this journey differs very considerably from that shown in even recently published maps.

The lofty range of hills, at the foot of which the town of Niriz is situated, is there locally termed the "Loirez" range; further to the north the same chain is called, from the villages and its southern slopes, the Koh-i-Deh Murd and the Koh-i-Kwaja Mali respectively. This range then runs on in a north-westerly direction past Booanat, Dehbid, and Isjdkhast, on the Teheran road. There are extensive forests of wild cherry-trees on the hills of Kwaja Mali, the wood of which forms a staple article of commerce. A thorough exploration of this chain of hills, from its culminating point, Padinah, to where it terminates near the shores of the Persian Gulf, would be most interesting geographically and geologically. Unfortunately, these hills are infested with robbers of the Lushani tribe, both summer and winter. Several times during our four days' journey in the Persepolis Valley their horsemen reconnoitred our party, which they evidently considered too strong to be worth an attack on the caravan.

The Kotro Valley beyond, with its solitary village, presents a picture of desolation that I have rarely seen equalled. It runs in a more southerly direction than the Persepolis one, and has no visible limit in that direction except the horizon. So far, indeed, does it extend, that the Collector of Kotro, Futh Ali Khan, repeating the popular tradition, told me it extended to the confines of Sind! This valley is famous for its herds of wild asses, or Ghur-i-Kher. There are in the neighbourhood, it is estimated, upwards of 2000 head. They may be seen browsing early in the morning; but, though I came across traces of them very frequently,

I was not fortunate enough to fall in with any. A good horse, if brought within a fair distance, can easily outrace them, but they have better wind. From Kotro there are two roads that lead to Saidabad, the chief town of the next valley to the east, called the valley of Sirjan. One path goes *viâ* Perpa and Mekabad to the south of Koh-i-Tung-Chal; the other *viâ* Bishni, Dasht, and Khairabad, by the route lying north of that mountain. I chose the latter. Bishni is a small village, nestled amongst some limestone-ridges, that form the northern boundary of the Kotro Valley. On the road I passed strata of slate and white marble. Crossing the watershed, we proceeded another stage on to Dasht or Sir-i-Dasht, a hamlet consisting of a cluster of wretched huts, and a solitary tower, with a not over-abundant supply of brackish water. The name of the place means "stone" in Turkish, from the fact of there being lead-mines here. I visited the works, if they can be so called. The seams containing the ore run parallel to the general strike of the hills. It is found both in the form of an oxide and associated with copper. It is reduced to a metallic state by pulverisation, washing, and heating in a blast-furnace; all of which operations are performed in the rudest and most primitive manner. The refuse copper-ore is thrown away, as the miners are not acquainted with the manner of reducing it to a metallic state. There are about forty miners here. The yearly out-turn is about 4500 mans, of which one-sixth is levied as a tax by the Fars Government. From Dasht I proceeded to Khairabad, which is situated at the foot of the Tung Chal range, and by the shores of another great salt lake. It was the frontier village of the province of Fars in this direction till lately; but now it pays revenue to the Government of Kerman. I here reached the valley separating the hills, which form a continuation of the Dehbid range, from those that are a continuation of the Koh Rud hills. This valley, therefore, extends from Ispahan, past Aberkoh-Shur Babek to Sirjan, and then onwards to the south-east past Baft, the Afshur, and Aktar districts, to that of Jiruft, and thence to Bampoor. The hills opposite to me at Khairabad are, so to speak, the backbone of the mountain-system of Iran.

Two stages further brought me to Kerman, where I stayed a week. This town is not well supplied with water, and there are many places in the Kerman Valley and near the town that would be preferable as the site for a large city. This spot, I suppose, was principally chosen for the sake of a rock of limestone, on which are the ruins at present of a fort, called the Kaleh-i-dokhter, from which a capital view of the city is obtained. As I wished to ascertain the true position of Khabis with reference to Kerman, I pro-

ceeded to that town, reaching it in three stages. It is on the north-east side of Kerman, separated from it by a mass of mountain, mostly limestone, but having the highest peaks of granite probably, as in a river-bed near Gok I saw numerous boulders of that material. Khabis is the name of a district and town producing dates and oranges, and the terminus for kafilahs proceeding across the deserts to and from Seistan, Neh, Kain, and Meshed, and is therefore of considerable importance; it is about 1500 feet above the sea. At the season we visited it (December 22nd) the climate was delightful. The gardens are extensive and look very pleasing, as the dark and other green tints of the orange-trees relieve the monotony of the date-palms interspersed. The supply of good water is constant and abundant. No less than eleven varieties of fruit of the *Aurantiaceæ* are grown here. The Persian name for this kind of fruit is "murukhubat." The names are as follows:—

Persian.	*English.*
Batavi.	Shaddock.
Baling.	Ditto.
Turunj.	Citron.
Narinj.	Bitter Orange.
Naringi.	Sweet Orange.
Bukrai.	Ditto.
Limou Khariki.	Lemon.
Maidani.	Sweet Lime.
Limou Ab.	Sour Lime.

Sweet oranges were procurable at the rate of one hundred for one franc. I anticipated being able to proceed from Khabis direct to Bam across the desert, or, rather, along its borders, passing by Kushit. The authorities, however, dissuaded me from attempting this route, on the plea of want of water and long marches. As the habitual security of this part of Persia had been lately rudely disturbed by a large body of Belooch robbers, I have no doubt but that was the real reason. I had, therefore, to re-enter the hills and proceed south by a valley parallel to the direct road, and reached the main route proceeding from Kerman to Bam; but, as the remainder of my journey to Bam is over a road lately described, this part of my travels calls for no further remarks.

ADDITIONAL NOTICES.

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1. *Visit to Tok-e-Tok, Chief of the Eighteen Tribes, Southern Formosa.* By T. F. Hughes, of the Chinese Imperial Customs, Shanghai.

The wild aborigines who inhabit the central, eastern, and southern districts of Formosa, have ever inspired, not only a certain amount of curiosity on account of their dogged, and, to a considerable extent, successful opposition to the inroads of strangers, Chinese or others, but also an immense amount of terror to the unwary stragglers across the borders—the enterprising Chinese who push their agricultural industry within the shadow of their hills, or the ill-fated mariners who may be driven by storms upon their inhospitable shores. Of late years, however, there have been signs of a change: the untamed mountaineers seem to be emerging from the seclusion which has hitherto surrounded them, and to be more tolerant than formerly of the approach of strangers to their native wilds and fastnesses. Foreigners have more than once penetrated into the savage territory eastward in a direct line from Takow; farther north, the savages in some districts have now become quite accustomed to the casual visits of Europeans, and on three or four different occasions small exploring parties have visited the tribes who inhabit the hilly regions in the neighbourhood of the South Cape. In almost every case the savages proved themselves ready to meet kindness with kindness, and in a great many instances the hand of friendship and of hospitality was readily extended to the foreign visitor. It is to be hoped that such a disposition on their part will be encouraged as much as possible by all who have an opportunity of exercising a beneficial influence upon them; for there can be no doubt that contact with civilized people will, gradually but surely, exercise happy results upon these unsophisticated, and, in many respects interesting, children of nature, and will in time bring to their minds the persuasion that in the outer world, to which they have hitherto been strangers, there is much good to be learned, and much usefulness to be acquired. Already the slight intercourse they have had with Europeans has commenced to tell. Until recently no unfortunate mariners, driven on the southern coast, met with any mercy at the hands of the savages; and the massacre of Captain and Mrs. Hunt and the crew of the American barque *Rover*, by the wild Koa-luts, is still fresh in the memory of us all. Thanks, however, to the energy of General Le Gendre, United States Consul for Amoy and Formosa, an agreement has been made with the chief of the eighteen tribes of South Formosa, by which the lives of shipwrecked sailors are for the present secure on the most dangerous part of the coast, from Tui-La-Sok River (about 22° 3′ N. lat.) on the east, round by the south of the island to Loong-kiao Bay on the west. The good faith of the aborigines, surrounded as they are by the wily, plotting, avaricious Hakkas, is with many a moot question; but, taking results as our guide, we can only say, that up to the present, so far from any breach of the agreement having taken place, a desire has been manifested by the savages to carry out the stipulations agreed upon in their integrity. The only opportunity which has hitherto taken place to test the good faith of Tok-e-kok, and his subjects, occurred last October under the following circumstances.

A junk, chartered by Messrs. Millisch and Co., of Tamsui, had proceeded to a point on the north-coast for the purpose of procuring timber, required for

certain buildings at Kee-loong. Mr. Horn, an employé of Messrs. Mellisch and Co., accompanied the party on board the junk, and they were all returning with a full cargo to Kee-loong, when they met a furious gale of wind which blew them to the southward, and, after depriving them of sails, masts, &c., flung them on a rocky shore to the north of Tui-la-sok River, where the vessel went to pieces. A mighty wave sweeping over the wreck, unfortunately washed Mr. Horn and 17 Pei-po-hwans overboard; but the remainder of the party, consisting of 1 Manila man, 1 Malay, and 16 Pei-po-hwans, were carried safely on shore. Mr. Horn and the others who were washed away were never afterwards seen; and the 18 castaways, after walking for some distance along the shore, came into the territory of Tok-e-Tok, by whom they were taken over and treated with forbearance, if not with kindness. Soon after their arrival, the chief sent a messenger, through the intervention of some friendly Chinese in the neighbourhood, with a few scanty particulars of the case to Mr. Pickering: a gentleman in the employ of Messrs. Elles and Co., at Taiwan-foo, who is well known amongst some of the savage tribes, and who, by his knowledge of the local Chinese dialect, rendered valuable assistance to General Le Gendre in his efforts to bring about and ratify a convention in 1867. Mr. Pickering, on receipt of the intelligence, started, in company with another gentleman and the writer, for the South Cape, without knowing all the details of the disaster, but with the intention of rendering assistance where it might be required, and with the hope that the castaways, whoever they might be, whom Tok-e-Tok was detaining, should accompany us on the return journey.

On the 12th of November we sailed from Takow in an open fishing-boat, and, coasting along the western shore of the island in a southerly direction, we came next morning to Hong-kang, a small straggling village inhabited by Chinese, who live by fishing and by trading with the neighbouring half-castes and savages, with whom they seem to be on friendly terms. Firewood, large loads of which come down from the interior on carts drawn by buffaloes, appears to be the principal article of export. Deer-horns and sinews are also to some extent exported, and the small quantity of rice which finds its way out of the place is said to have a whiter and larger grain than that raised in any other part of the island. Leaving our boat at Hong-kang we continued our southerly course on foot, and proceeded along the base of the magnificent range of mountains which here skirts the sea, through a country thickly covered with brushwood, and apparently uninhabited. On either side of us, Nature, in its grandest and most sublime attitude, reigned supreme: on our right lay the open sea, stretching away to the distant western horizon; on our left rose the massive hills, clad to their very summits with primeval forests, and our path lay through a close jungle, which is said to afford cover for wild animals of various kinds. The savages frequently hunt in this neighbourhood, and occasionally lie in wait here for any unfortunate wayfarer who may happen, for any reason, to be obnoxious to them. No half-measures seem to be employed, or expected, by the savages whilst at war with the Hakkas; quarrels are constantly occurring between them, and, as they are far from the reach of any lawful authority, the *lex talionis* is their only guide and arbiter. When a quarrel takes place, and lives are lost, which not unfrequently happens, more lives must be taken, and these murders call again for fresh reprisals, so that the country is almost always in a state of war. Hence the very coolies who accompanied us from Hong-kang were armed to the teeth; and when we emerged from the jungle, and came once more to a populated region in the neighbourhood of Chia-siang, we found that all the inhabitants, from the sturdy peasant at his plough to the youngest herd-boy in the fields, were armed with matchlocks, spears, or bows. The Chinese settlers have, therefore, to carry on their industrial pursuits with fear and trembling; and the

soil, in consequence, even in the immediate vicinity of towns, is not nearly in such a high state of cultivation as it is capable of becoming under more favourable auspices. Chia-siang, or Loong-kiao, as it is sometimes called, is a partly walled town, inhabited by the descendants of some Fokhien immigrants, who settled down here some two centuries ago. Many of the neighbouring Pei-po-hwans, or aborigines of the plains, come to Chia-siang to trade; and in this place, goods of foreign and Chinese manufacture, as well as all kinds of savage curiosities, matchlocks, swords, embroidered jackets and pouches, belts of silver filagree work, &c., are exposed for sale. It may be mentioned here that Loong-kiao Bay affords a capital anchorage for vessels in the north-east monsoon. A few li further south lies Hia-liao, a village picturesquely and comfortably situated on the shores of Loong-kiao Bay, and the most southerly of all the villages inhabited by Chinese. Here, as indeed at all the other places we visited, we were received with the most marked hospitality and kindness. Our host happened to be an old friend of Tok-e-Tok, the savage chief, and next morning he deputed his son to act as our escort to the savage territory. The scenery along the road between Hia-liao and the hills is grand in the extreme: a great portion of the ground is uncultivated, but it is thickly covered with tropical plants growing in wild luxuriance; the plantain, wild pine, and feathery bamboo, all add their beauty to the scene, while here and there the graceful areca-palm rears its long tender stem, with its ornamental tuft of leaves at the top. In the neighbourhood of the hamlets through which we passed, we noticed a few patches of millet, sweet potatoes, &c.; but the nearer we got to the savage dominions, the wilder became the scenery, and the less frequently did we meet with cultivation of any kind. The hamlets themselves are generally embowered in foliage: long stately bamboos clustering round the dwellings, and the houses, as a rule, are clean and tolerably well provided. The people are most profuse in their hospitality: everywhere we were not only invited to sit down, but food and drink were almost invariably offered to us. It was interesting to observe the gradual disappearance of the true Chinese type of countenance the farther we penetrated into the hills; the greatest difference was noticeable in the women, of whom the last true Chinese type was observed at Hia-liao. As far as appearance and manners go, both men and women seemed to be all the better for the admixture of savage blood: the men appeared to be all the more honest, brave and generous; the women more beautiful, natural, and dignified.

Towards evening we came in view of the Pacific Ocean, and the valley in which Tok-e-Tok resides was also pointed out to us. Here the real savage hunting-grounds commence. Cultivation is no longer visible; vast prairies covered with thick, waving grass, but which in civilized hands might be made to teem with useful vegetation, stretch away far as the eye can see, and the neighbouring lofty peaks are thickly covered, up to their very summits, with venerable forests, where the wild deer, as well as game of a more formidable nature, are said to abound.

In the course of our journey through the hills, we passed one of those strange phenomena, by no means uncommon in Formosa, a bright flame jutting out of the hard-baked earth. It was shown to us as a volcano; but it was quite evident that the fire was caused by the ignition, chance or otherwise, of the vapour issuing from a petroleum spring existing underneath. The frequency of this spectacle proves the existence of another mine of wealth as yet undeveloped in this island.

We arrived about sunset at Tok-e-Tok's residence: a long one-storied building, the central portion of which is some few feet higher than the rest of the house; the walls are built of mud-bricks, the floors are hard and dry, and the house is divided into half-a-dozen compartments, separated by partitions of bamboo and mud-plaster. A permanent screenwork of bamboo runs along

the entire frontage from the ground to the projection of the roof, about three feet from the main wall, forming a protection against wind and heat, and leaving a covered passage, like a verandah, between the doors of the principal apartments. The rooms are without ceilings, but the inner portion of the roof is very neatly and artistically finished with dried grass and strips of bamboo. No ornament of any kind was noticeable about this savage palace, except the few skulls of various wild animals suspended near the principal entrance; none of the trappings of sovereignty were visible, nothing, in fact, to be seen which of itself went in any to prove that we rested beneath the roof of the Chief of the Eighteen Southern Tribes.

Most of the savages, we were told, were away on a hunting-expedition, and the Chief himself was engaged in the settlement of a brawl which had taken place between two of his subordinate clans. In the mean time, we were shown to the house were the shipwrecked Pei-po-hwans were detained, and the intense delight which our appearance gave these poor people was enough of itself to recompense us for our lengthened journey. No doubt they looked upon our arrival, after fifteen days' suspense as to their ultimate fate, as the harbinger of hope, and the almost certain presage of their speedy liberation.

Before we returned to the Chief's house we had an opportunity—which we did not seek for a second time—of seeing a savage work himself up almost to the killing point. We were just about to leave, when two or three Koa-luts —the tribe which perpetrated the *Rover* tragedy—appeared upon the scene, apparently the worse for liquor. One of them, as wild a looking specimen of humanity as it has ever been my lot to see, became, apparently without cause, momentarily more excited, and at last drew his sword, and rushed violently about, brandishing it and plunging it into the ground, shrieking and foaming at the mouth all the time. Knowing, as we did, that there was a strong difference of opinion amongst the savages as to the advisability of taking off strange heads that might happen to come in their way, we did not feel particularly comfortable as we walked away with this wild Koa-lut performing a war-dance at our heels; and our composure was by no means strengthened when, on venturing upon a look behind, we found that the man had got his bow and arrows in readiness, and was only being soothed and kept under by a woman, possibly his wife. Untrustworthy and fickle as the savage temper is, especially when inflamed by drink, there may have been a little danger to us here: but, from that moment until we left the savages, we met with nothing but uniform kindness and patriarchal hospitality, and even this wild Koa-lut himself became most friendly with us before our departure.

On our return to Tok-e-Tok's house, we found that dinner had been prepared for us: venison, pork, and excellent rice formed the principal dishes, and a very good species of samshoo, distilled from the sweet potato, was served out to us by some of the ladies of Tok-e-Tok's household. I was astonished, not so much at their hospitality, for we were prepared to meet with that, as at their natural refinement of feeling and manner. Profuse apologies were constantly being offered for the scantiness of their fare, and the lowliness of their entertainment generally; and when a crowd of curious members of both sexes had assembled round the door to gaze upon and watch us at our meal, they were quickly dispersed and chid for their want of manners. In various other ways, too, we were surprised to find a considerateness and a rough politeness amongst these "savages" which might have done credit to many a civilized and more ostentatious people. After dinner, we adjourned to the principal apartment,—Tok-e-Tok's drawing-room in fact,—and, squatting down amongst our newly acquired friends, we soon managed to make ourselves quite at home. We smoked socially together, and chatted away through our Chinese interpreter; and when our hosts discovered that we desired to hear them sing, they unhesitatingly burst into melody. They gave us several songs, all of them sung with

the natural voice, in a minor key, and, although rather monotonous and droning, occasionally containing some really quaint melody and musical pathos. Congreve says "music hath charms to soothe the savage breast;" and these rude vocalists, who could become on occasions fierce and cruel as tigers, yielded to the gentle influence of the muse, and appeared to us as quiet and tractable as little children. In fact, with the one exception already alluded to, we saw little of the savage temperament amongst Tok-e-Tok's people; and if we had to complain of any peculiarity of their character, it would be of their too expressed kindness and hospitality—qualities which we do not usually associate with uncultivated taste. Your thorough-paced savage is a creature *sui generis*. He has his good and bad qualities; but the former are all his own, for they are not at all prominent amongst the Hakkas, with whom he principally comes in contact, whilst the latter may in a great measure be attributed to the various vitiating circumstances which surround him.

Like most uncultivated people, the savages look upon life as a mere bagatelle, and take it as lightly as other men do their dinners. But we ought to remember what Professor Huxley has somewhere said, that "in the early ages of the world, the first impulse of man was, not to love his neighbour, but to eat him;" and when we consider that there is, as far as we can ascertain, a total absence of cannibalism amongst this primitive people, and that they are even showing a disposition to abandon their inclination to slaughter, wantonly, strangers who give them no grounds for provocation, we may safely infer that they have made, at all events, some progress, however slight, on the road to enlightenment and civilization. There is still, of course, very much room for improvement, but the germs of a fine people are to be found amongst them. As a race, they possess physical advantages which are not shared by their Chinese neighbours; and this is owing, doubtless, in some measure, to that "struggle for existence" which must take place amongst savage races, to a more palpable extent than amongst civilized people. The men are all straight, well-formed, and vigorous; the women approach as closely to the perfection of the "mortal mixture of Earth's mould" as it is possible to conceive. However much the fact is to be regretted, there are no doctors or patent medicines amongst the savages, to enable the weak and sickly to survive; and, in their almost daily conflicts, the strong men of course conquer, and the weak go to the wall.

The Southern savages mix more with the Chinese—Hakkas principally—than do the tribes farther north, and they have so far adapted themselves to the customs of their conquerors as to wear the "pig-tail," and shave their heads. The most remarkable peculiarity about their appearance is the large piece of wood or shell which is fitted into the lobe of the ear, giving an unusually large and intensely ugly aspect to the organ of hearing. The men wear neat, tightly-fitting, embroidered jackets; and the nether portion of their dress is a scantily-cut piece of embroidered cloth, which goes rather more than half-way round the waist, and extends downwards to about the middle of the thigh. The dress of the women is particularly modest and becoming, and is well calculated to show to advantage their graceful figures. The style of arranging their luxuriant hair is an improvement on the Chinese mode, and approximates, to a considerable extent, to some of our European fashions. We did not notice a single bad face amongst the many women we saw, and their features would be most striking, were it not for the repulsive appearance the constant chewing of betel-nut gives to their lips and teeth.

Betel-nut chewing is practised to a very great extent amongst the savages of Formosa, as it is amongst all the Malay and Polynesian races. The old and young of both sexes alike indulge in this fascinating narcotic; and, when people meet, it is the custom to open out their pouches, where the "materials" are kept, and offer a "chew" with an off-hand grace which would put many of our snuff-takers of by-gone days to the blush. The preparations for chewing are simple enough: some leaves of the betel-pepper,

Chavica Betle, are smeared with a lime formed from calcined shells, and the nut is then neatly folded in the leaf, and placed in the mouth. The pleasant effects of this masticatory performance, not having been to any extent, if at all, experimentally investigated by Europeans, cannot with accuracy be pronounced upon; but there certainly must be a considerable amount of fascination in it, when so many millions of people, scattered up and down the Pacific, chew it almost constantly, from their cradle to the grave. No other narcotic, except perhaps tobacco, is so extensively used. It is difficult to discover, even from the chewers themselves, what the particular pleasure obtained really is. They say, generally, that the process promotes flow of saliva, and lessens the propensity to perspire freely; that it imparts an agreeable odour to the breath, secures the teeth, cleanses the gums, and cools the mouth. It stains the lips and teeth red, and thus gives an appearance to the chewers highly disgusting to European taste; but the natives, no doubt, consider it ornamental and *à la mode*. It is possible that the exhilarating and agreeable effects may arise from the chemical action of the lime and saliva upon the ingredients of both nut and leaf.

On the morning after our arrival, we had an interview with Tok-e-Tok concerning the main object of our visit. This Chief, who is a tall, active, robust man of sixty or thereabouts, was surrounded by his principal advisers, and received us very graciously. We all took our seats on benches, without any ceremony; and, before the proceedings had been regularly opened, an old woman went about the room offering a cup of samshoo to be sipped by each one, and muttering all the time a sort of chant or monologue—probably an incantation—to ward off evil influences from our conclave. We were speedily informed that the shipwrecked people were at liberty to depart, the Chief only claiming an amount of dollars to cover the expenses, he said, that had been necessarily incurred during their detention; and, as we did not consider the sum exorbitant under the circumstances, we took upon ourselves the responsibilty of guaranteeing it to him, in the event of his continuing to treat the castaways with forbearance, and restoring them to liberty when the proper messenger should arrive with the money. Business over, we expressed our desire to depart without further delay; but the Chief lent a deaf ear to our entreaties, and actually compelled us to remain and share a feast with him. No sooner had our reluctant consent been obtained, than a wild whoop was raised, and every savage, with his bow and arrows, rushed off to share in the destruction of the animals which were to form the principal attraction of our banquet. In a few minutes they all returned, bringing with them a supply sufficient to regale the entire tribe, and the cutting up and cooking were forthwith entered upon in a highly artistic style. The feast at last commenced, and we were honoured with benches and a table, while Tok-e-Tok and his subordinates squatted in two parallel rows upon the floor. The spoils resulting from former raids must have been carefully ransacked, for silver spoons and forks were produced on our behalf. All the tit-bits of the slaughtered animals were reserved for us; in fact, every effort that could possibly be made was exercised to render us comfortable and happy. At the end of the repast, we managed to get away with some difficulty; and, accompanied by the Manila man, we started on our return journey. Many of our kind entertainers escorted us some distance along the road; and a wild valedictory shout, which found many an echo amongst the surrounding hills, was the *congé* we received, on our departure from the territory of Tok-e-Tok.

It only remains to be told, that the savage Chief treated with kindness the Pei-po-hwans we left in his keeping; and when, owing to the news we brought back to Takow, that some Chinese subjects were temporarily detained among the savages, the local authorities despatched messengers with the requisite funds to Tok-e-Tok, the people were at once handed over, and subse-

quently reached Taiwan-foo in safety, from whence, it is to be hoped, they easily found their way to their homes in the north.

CLIMATE.—During the prevalence of the north-east monsoon—*i. e.* from October to May—the climate of South Formosa is very salubrious, the temperature being similar to that of Italy and the south of France.

Takow is on a narrow strip of land, between a large lagoon and the sea; fully sheltered from the north and east by a high hill, situate at the northern part of the narrow entrance to the harbour, called Ape's Hill, on account of the large number of large apes inhabiting its rocky sides.

This settlement enjoys the full force of the south-west monsoon; and, although the hot season is a long one, the thermometer seldom, if ever, exceeds 90° or 92° Fahrenheit.

I believe that no port south of Tientsin can boast of such a moderate maximum temperature. It is certain that the winter here is milder than at other ports,—too mild, in fact, for the robust; but, for the weak and consumptive, it might afford a very fair substitute for the health-resorts of the Mediterranean.

To the indolent, the intemperate, and the sedentary, the prolonged heat is most enervating and dangerous; but to a moderate man, who will take the trouble to find occupation and take exercise, no tropical climate could be more healthy and enjoyable. A week or two of heavy rain in the summer is all the rain that falls near the coast; while, only a few miles inland, it rains and thunders every afternoon from July till September.

The city of Taiwan-foo lies very low, and some distance from the sea. It therefore gets but little of the summer breeze, and that little, after it has been heated by passing over a desolate, uncultivated plain. The city is, consequently, in summer time exceedingly sultry and unhealthy.

I should here mention, that while vessels can visit Takow at any season during the year, Anping, the port of Taiwan-foo, being only an open roadstead, is closed, during the south-west monsoon, to native and foreign craft.

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2. *Geographical Positions in the Valley of the Amazon.* By I. HENRY ROCHELLE, Senior Member and Acting President of the Peruvian Hydrographic Commission of the Amazon.

(Communicated by W. CHANDLESS, Esq., Gold Medallist R.G.S.)

DISTANCES:—From the mouth of the Ucayali River to Sarayacu, 269 miles. From Sarayacu to the mouth of the Pachitea River, 306 miles. From the mouth of the Pachitea River to the confluence of the rivers Tambo and Urabamba with the River Ucayali, 197 miles. Total from the mouth of the Ucayali to its confluence with Tambo and Urabamba, 772 miles.

Iquitos (on the Amazon). Lat. 3° 44′ 15″ s., Long. 73° 07′ 34″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Tamchiyacu (on the Amazon). Lat. 3° 59′ 00″ s.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Nauta (on the Amazon). Lat. 4° 31′ 30″ s.; Long. 73° 07′ 30″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Mouth of the Ucayali River. Lat. 4° 30′ 00″ s.; Long. 73° 05′ 00′ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Mouth of the Cuyagaili River. Lat. 4° 56′ 30″ s.; Long. 73° 37′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Cipriano Tipisca (on the Ucayali). Lat. 5° 16′ 00″ s.; Long. 73° 44′ 45″

w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Punga Tipisca (on the Ucayali). Lat. 5° 26′ 00″ s.; Long. 73° 48′ 30″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Acuracaya (on the Ucayali). Lat. 5° 38′ 00″ s.; Long. 73° 51′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Playa Pancha (on the Ucayali). Lat. 5° 45′ 00″ s.; Long. 73° 58′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Piuri Island (in the Ucayali). Lat. 5° 51′ 00″ s.; Long. 73° 58′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Lago de Pucacuru. Lat. 6° 07′ 00″ s.; Long. 74° 38′ 15″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Puerto de Sarayacu (on the Ucayali). Lat. 6° 43′ 25″ s.; Long. 74° 37′ 12″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Puerto de Cashiboya (on the Ucayali). Lat. 7° 04′ 00″ s.; Long. 74° 13′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Puerto de Roaboya (on the Ucayali). Lat. 7° 49′ 20″ s.; Long. 74° 27′ 47″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Calleria (on the Ucayali). Lat. 8° 03′ 39″ s.; Long. 74° 02′ 58″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Isla Abajar (in the Ucayali). Lat. 8° 26′ 00″ s.; Long. 73° 47′ 20″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Mouth of the River Pachitea. Lat. 8° 47′ 00″ s.; Long. 74° 07′ 40″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Caushi-mashi Playa (on the Ucayali). Lat. 9° 37′ 00″ s.; Long. 73° 43′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Isla Jenipanchea (in the Ucayali). Lat. 9° 44′ 00″ s.; Long. 73° 37′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Caimito (on the Uyacali). Lat. 9° 49′ 54″ s.; Long. 73° 36′ 35″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Schebuña (on the Ucayali). Lat. 10° 02′ 15″ s.; Long. 73° 32′ 45″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Pacalla (on the Ucayali). Lat. 10° 09′ 20″ s.; Long. 73° 33′ 45″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Pucani (on the Ucayali). Lat. 10° 32′ 21″ s.; Long. 73° 27′ 30″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Mouth of the River Tambo. Lat. 10° 41′ 00″ s.; Long. 73° 14′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

A point on the River Urubamba reached by the Peruvian Exploring Steamer "Napo," *on the 20th of October*, 1868. Lat. 10° 45′ 00″ s.; Long. 73° 07′ 15″

w. of Greenwich. Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

A point on the River Urubamba reached by the Peruvian Exploring Steamer "Napo," *on the 21st of October*, 1868. Lat. 10° 31′ 00″ s.; Long. 73° 07′ 25″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

A point on the River Urubamba reached by the Peruvian Exploring Steamer "Napo," *on the 22nd of October*, 1868. Lat. 10° 43′ 00″ s.; Long. 73° 12′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Mouth of the River Tambo. Lat. 10° 41′ 00″ s.; Long. 73° 14′ 00″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1870.

Mouth of the River Apurimac. Lat. 10° 58′ 00″ s.; Long. 73° 26′ 30″ w. of Greenwich.—Observers: Peruvian Hydrographic Commission of the Amazon, 1868.

Iquitos (on the Amazon). Average height of Barometer, 751 millimetres; Thermometer (centigrade), average height, 24°. Elevation above level of sea, 107 metres. Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Yurimaguas (on the Huallaga). Lat. 5° 53′ 13″ s.; Long. 76° 00′ 58″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Balza-Puerto (on the Cachi-yacu). Lat. 5° 50′ 00″ s.; Long. 76° 27′ 20″ w. of Greenwich. Barometer average, 742·2 millimetres; elevation above level of sea, 208·6 metres.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Mouth of the River Paranapura. Lat. 5° 54′ 30″ s.; Long. 76° 01′ 00″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Hacienda Limon (on the Paranapura). Lat. 5° 51′ 20″ s.; Long. 76° 05′ 09″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Pueblo de Munichi (on the Paranapura). Lat. 5° 52′ 05″ s.; Long. 76° 07′ 33″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Mauca Baradero Playa (on the Paranapura). Lat. 5° 51′ 36″ s.; Long. 76° 11′ 49″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Playa de Tuna-Tacu (on the Paranapura). Lat. 5° 49′ 37″ s.; Long. 76° 11′ 49″ w. of Greenwich. Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Playa de Cuculisa (on the Paranapura). Lat. 5° 46′ 06″ s.; Long. 76° 14′ 36″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Place where Peret was assassinated (on the Paranapura). Lat. 5° 45′ 17″ s.; Long. 76° 14′ 36″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Baradero casa del Gobernador (on the Paranapura). Lat. 5° 43′ 54″ s.; Long. 76° 19′ 55″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Confluence of the Cachi-Tacu and Paranapura. Lat. 5° 43′ 40″ s.; Long. 76° 20′ 40″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Mouth of the Kaina-Rachi at its junction with the Huallaga. Lat. 6° 08′ 00″ s.; Long. 75° 50′ 40″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Huimbayo, near Quillu Caca.—Lat. 6° 25′ 20″ s ; Long. 75° 44′ 10″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Pongo Huamany Huasi. Lat. 6° 30′ 47″ s.; Long. 75° 52′ 25″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Primera Chacra depues los Pongos. Lat. 6° 33′ 45″ s.; Long. 75° 52′ 25′ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Chasuta (plaza). Lat. 6° 35′ 03″ s.; Long. 76° 06′ 47″ w. of Greenwich. —Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Tarapoto (plaza). Lat. 6° 29′ 30″ s.; Long. 76° 20′ 15″ w. of Greenwich. —Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Lamas (plaza). Lat. 6° 24′ 30″ s.; Long. 76° 31′ 00″ w. of Greenwich.— Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Tabalosos (plaza). Lat. 6° 22′ 40″ s.; Long. 76° 31′ 00″ w. of Greenwich. —Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Moyobamba. Lat. 6° 02′ 10″ s.; Long. 76° 54′ 20″ w. of Greenwich. Barometric average height, 688·8 millimetres. Thermometric average height (centigrade), 20°. Elevation above level of sea, 847·2 metres.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Chachapoyas. Lat. 6° 13′ 12″ s.; Long. 77° 46′ 05″ w. of Greenwich. Barometer, 579·5 millimetres. Thermometer (centigrade), 16°. Elevation of the plaza above the level of the sea, 2323 metres.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Lamud. Lat. 6° 05′ 38″ s.; Long. 77° 51′ 06″ w. of Greenwich. Barometer, 582 millimetres. Thermometer (centigrade), 14·1°. Elevation above level of sea, 2276 metres.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Pururcar. Lat. 5° 52′ 52″ s.; Long. . Barometer, 6535 millimetres. Elevation above level of sea, 1343 metres.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Bagua Chica (on the Utcubamba). Lat. 5° 38′ 22″ s.; Long. 78° 27′ 55″ w. of Greenwich. Barometer, 726 millimetres. Thermometer (centigrade), 23°. Elevation above level of sea, 393 metres.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Playa Guaya Shango (on the Amazon). Lat. 5° 10′ 58″ s.; Long. 78° 20′ 50″ w. of Greenwich. Barometer, 738·6 millimetres. Thermometer (centigrade), 23°. Elevation above the level of sea, 249 metres.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Borja (on the Amazon). Lat. 4° 28′ 30″ s.; Long. 77° 26′ 55″ w. of Greenwich. Elevation above level of sea, 174 metres.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

Limon (on the Amazon). Lat. 4° 47′ 20″ s.; Long. 77° 03′ 30″ w. of Greenwich.—Observer: Arthur Wertheman, Engineer of the Department of Amazonas, Peru, 1871.

The foregoing geographical positions were established by competent and careful observers, who were furnished with good instruments.

Iquitos, Peru, February 15, 1872.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED SEPTEMBER 23RD, 1872.]

SESSION 1871-72.

Twelfth Meeting (ANNIVERSARY), 1 P.M., *May 27th*, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Charles Burt, Esq.; Cæsar Czarnikow, Esq.; R. N. Cust, Esq.; Andrew Gray, Esq.; Lieut. T. H. Larcom*, R.N.; *Sir T. Galbraith Logan*, K.C.B., M.D.; *John Pickering, Esq.; William Nicholas Thomas, Esq.*, R.N.; *Nathan Wetherell, Esq.; J. Valentin, Esq.*

The Bye-laws relating to the Anniversary Meetings having been read, Sir DONALD M'LEOD and Captain W. J. EASTWICK, R.N., were appointed Scrutineers of the Ballot.

After which, the Secretary, Mr. C. R. MARKHAM, read the Report of the Council for the past year, and the Special Report on the Society's new House, No. 1, Savile Row, drawn up by Mr. JAMES FERGUSSON, Chairman of the House and Fitting Committee.

On the motion of Professor TENNANT, seconded by the Rev. R. J. GOULD, the Reports were received and adopted.

The PRESIDENT then proceeded to deliver the Medals for the encouragement of Geographical Science and Discovery. The FOUNDER'S MEDAL to Colonel HENRY YULE, C.B., for the eminent services he rendered to Geography in the publication of his three great works—'A Mission to the Court of Ava,' 'Cathay, and the Way Thither,' and 'Marco Polo.' The Medal was received by Sir William Baker on behalf of Colonel Yule. The PATRON'S MEDAL to ROBERT BERKELEY SHAW, for his Journey in Eastern Turkistan, and for his extensive series of Astronomical and Hypsometrical Observations, which have enabled us to fix the longitude of Yarkand, and have

given us, for the first time, the basis of a new delineation of the countries between Leh and Kashgar. The Medal was received by Mr. Shaw in person, with an address.

The PRESIDENT next presented a Gold Watch to Commander G. C. MUSTERS, R.N., "for his adventurous journey in Patagonia through 960 miles of latitude, of which 780 were previously unknown to Europeans;" which was received and acknowledged by Mr. J. C. Musters, in the absence of his brother, Commander Musters. A sum of 25*l.*, awarded to Herr Karl Mauch, "in acknowledgment of the zeal and ability with which he devoted himself, for a series of years, to the Exploration of South-Eastern Africa," was then presented; Baron von Schmidthals, German Secretary of Legation, receiving it on behalf of Karl Mauch.

Previous to delivering the Medals awarded by the Public Schools Prizes Committee to the successful competitors in Physical and Political Geography, the PRESIDENT called upon Mr. Francis Galton to read to the Meeting the results of the Examinations for 1872.

Mr. GALTON (Chairman of the Public Schools Prizes Committee), after mentioning that the names of the successful candidates had been announced from the Chair at the previous Meeting, gave a short *résumé* of the work of the Committee, and said that the Council of the Society had decided, on the present occasion, to award and send a handsome Atlas to each boy, including the Medallists who had been honourably mentioned.

The Examiners, H. W. Bates, Esq., and T. W. Hinchliff, Esq., next introduced the Medallists to the President, who then presented the Gold Medal for *Physical Geography*, to S. E. Spring Rice (Eton); the Gold Medal for *Political Geography*, to W. G. Collingwood (Liverpool); the Bronze Medal, for *Physical Geography*, to A. S. Butler (Liverpool); and the Bronze Medal for *Political Geography*, to W. C. Graham (Eton), which were received by the Medallists in person.

The Hon. G. C. BRODRICK addressed the Meeting on behalf of the Public Schools.

After the presentation of the Medals and Prizes, the President proceeded to read the Annual Address on the progress of Geography.

A vote of thanks to the PRESIDENT for his Address was then proposed by Sir RUTHERFORD ALCOCK, seconded by Mr. CHARLES WHITE, and carried unanimously.

At the hour appointed by the Society's regulations the Ballot took place, and the Scrutineers declared the following gentlemen to

have been elected as officers of the Society for the ensuing year, the names in italics being those newly appointed:—*President:* Major-General Sir Henry C. Rawlinson, K.C.B., D.C.L., F.R.S. *Vice-Presidents:* The Earl of Derby; Sir H. Bartle Frere, K.C.B., G.C.S.I., D.C.L.; Francis Galton, Esq., M.A., F.R.S.; Rear-Admiral G. H. Richards, F.R.S. *Trustees:* Lord Houghton, D.C.L., F.R.S.; Sir Walter C. Trevelyan, Bart. *Secretaries:* Clements R. Markham, Esq., C.B., F.S.A.; R. H. Major, Esq., F.S.A. *Foreign Secretary:* John Ball, Esq., F.R.S. *Councillors:* *Sir Rutherford Alcock*, K.C.B.; Admiral Sir George Back, D.C.L., F.R.S.; Hon. George C. Brodrick; Sir Thomas Fowell Buxton, Bart.; Rear-Admiral R. Collinson, C.B.; *Right Hon. Sir Thomas F. Fremantle, Bart.; H. Hucks Gibbs, Esq.;* Lieut.-Col. James A. Grant, C.B., C.S.I.; Vice-Admiral Sir W. H. Hall, K.C.B., F.R.S., D.C.L.; Kenneth R. Murchison, Esq.; *John Murray, Esq.;* Sir Charles Nicholson, Bart., D.C.L.; *Vice-Admiral E. Ommanney*, C.B., F.R.S.; Captain Sherard Osborn, R.N., C.B., F.R.S.; John Rae, Esq., M.D., LL.D.; Arthur J. E. Russell, Esq., M.P.; S. W. Silver, Esq.; Warington Smyth, Esq., F.R.S.; B. C. Stephenson, Esq.; *Major-General Richard Strachey*, R.E., C.S.I., F.R.S.; *Captain C. W. Wilson*, R.E.; *Treasurer:* Reginald T. Cocks, Esq.

PRESENTATION

OF THE

ROYAL AND OTHER AWARDS.

(At the Anniversary Meeting, May 27th, 1872.)

ROYAL MEDALS.

THE FOUNDER'S MEDAL for the year was awarded by the Council of the Society to Colonel H. Yule, C.B., for the eminent services rendered by him to Geography in the publication of his three great works: 1. 'Narrative of a Mission to the Court of Ava in 1855'; 2. 'Cathay and the Way Thither,' 1865; 3. New Edition of 'Marco Polo,' 1871; and in the numerous articles contributed by him to the Geographical and other learned Journals of the Metropolis. The PATRON'S MEDAL was awarded to Robert B. Shaw, for his Journeys in Eastern Turkistan, and for his extensive series of astronomical and hypsometrical observations, which have enabled us to fix the longitude of Yarkand, and have given us for the first time the basis of a new delineation of the countries between Leh and Kashgar.

On presenting the Founder's Medal to Major-General Sir William Baker, on behalf of Colonel Yule, the PRESIDENT spoke as follows:—

"I have to discharge a duty on the present occasion which is doubly agreeable to me. I have, in the first place, to present the Founder's Medal of the Royal Geographical Society to an officer who has been long engaged in kindred studies with myself, and in whose success, therefore, I take the warmest personal interest; and, in the next place, in the unavoidable absence of that officer from England, I have to entrust the Medal to you, Sir, one of my official colleagues, with whom I am in daily relation, and for whose judgment, character, and attainments, I entertain the very highest respect.

"I need not recall to you, Sir, the early career of Colonel Yule in India. Acting, as he did, for so many years under your orders in the Public Works Department of the Government, you must have had abundant opportunities of observing his many high qualities as a

servant of the State, and the many estimable traits of his private character. To high professional attainments he must always have added a natural diligence of habit, combining with it that earnest and conscientious attention to his duties, which is the distinguishing characteristic of an Indian official; and, if we may judge from the many papers which he contributed during his early service in India to scientific journals, he must, further, have possessed from the first a fine literary taste, and a happy facility of composition.

"After performing good service to the Government, both in the Kasia Hills, and in charge of the Western Jumna and Ganges Canals, he was selected, while discharging the responsible duties of an Under Secretary to Government, to accompany, as Secretary and Historiographer, the mission under Major (now Sir Arthur) Phayre, which was sent by Lord Dalhousie to the Court of Ava in the year 1855. On returning from this expedition he compiled and published, amid the horrors of the Indian mutiny, to which he touchingly alludes in the preface, 'A Narrative of the Mission;' bringing out the work with that completeness of detail in regard to notes and appendices and that luxury of illustration and typography, of which he well understood the value, and which have, in fact, so enhanced the sterling merit of his publications, as to cause them always to rank among the choicest as well as the soundest literature of the day. A very important chapter of this work, 'On the Map of Burmah, and the Descriptive Geography of the Province,' was transferred, with some slight alterations, to our own 'Journal,' and at once placed Colonel Yule in the front rank of Asiatic geographers.

"Colonel Yule having succeeded you, Sir, in 1858, as Secretary to Government in the Public Works Department, returned after a two years' further service, to England, and then retired from the army. Being now able to command more spare time than during his career in India, where, as he says, the leisure hours of an official are 'such as he may redeem from meals and sleep, between 8 p.m. and 10 a.m.,' Colonel Yule undertook several important works, demanding the severest application and the soundest critical judgment; and it is upon these works that his present high reputation depends. After breaking ground with Friar Jordan in 1863, he presented the Hakluyt Society with his two teeming volumes entitled 'Cathay and the Way Thither.' The text of this work was sufficiently curious, being a collection of all the extant minor mediæval travels through Central Asia, whether performed by Orientals or Europeans; but its great merit lay in a Preliminary Essay, extending to 250

pages, 'On the Intercourse of China and the Western Nations previous to the Discovery of the Sea-route by the Cape,' and on the wealth of annotation with which the two volumes were throughout enriched. The singular combination of curious research, careful criticism, and extensive reading, which 'Cathay' exhibited, had certainly never been equalled in any of the previous publications of the Hakluyt Society, and rarely, perhaps, in the whole range of English authorship. But it was not till some years later that Colonel Yule put forth his full powers, in his exhaustive and masterly edition of 'Marco Polo;' a work, the publication of which was said at the time, by one of the first critical journals of the day, to form an epoch in Geographical Literature. It is mainly for this noble work, which, beautifully printed and superbly illustrated as it is, will ever remain an imperishable monument of recondite learning, the most cultivated taste, and a sound practical knowledge of geography, that the Council of our Society has this year awarded its Founder's Medal to Colonel Henry Yule. Already, Sir, the distinguished corps in which your earlier career was passed—the Bengal Engineers—has carried off on two occasions the Geographical blue-ribbon of the year. It has now achieved a third triumph. I congratulate the Medallists, among whom I have the honour to rank myself, on being permitted to inscribe the name of Colonel Yule upon our list; and I more especially congratulate the Bengal Engineers on another Medallist being thus added to that glorious brotherhood of professional and literary eminence, which includes the names of Montgomerie, the Stracheys, the Cunninghams, George Chesney and Andrew Waugh; and among which are also to be found the still more honoured names of Sir Henry Durand, Sir William Baker, and Lord Napier of Magdala. I trust, Sir, that in forwarding this Medal to Colonel Yule, whose unavoidable absence we deplore, you will express to him the high admiration which the Council feel for his zealous and successful labours in the cause of Geography, and the satisfaction we experience in being thus enabled to reward them."

Sir WILLIAM BAKER replied in the following words:—"Sir,—On behalf of my friend Colonel Yule, whose unavoidable absence we all deplore, I beg to offer hearty thanks to the Royal Geographical Society for the high honour this day conferred upon him, and to you, Sir, for the eloquent eulogium in which you have so well set forth his claims to that honour. To myself, personally, it is a source of gratification that I am the appointed 'vehicle' by which

this enviable distinction will reach the hands of one of my earliest and most valued friends. On his account, however, I cannot but regret that he has not heard with his own ears the discriminating praises, which you have so well bestowed upon the results of his labours in the fields of literature and science, and that he has not seen with his own eyes the assent and approval of those praises, reflected from the countenances of your distinguished colleagues. For your sake, too, I am sorry that Colonel Yule is not here to answer for himself; for I am quite sure that the words, warm from the heart, which he would have uttered on such an occasion as this, would have been well worth listening to. And now, Sir, I would add a few words on my own account. I thank you sincerely for the kind but too flattering terms in which you have referred to myself, and still more for the compliment, not undeserved, which you have paid to my dear old corps, the Bengal Engineers."

Next addressing the Meeting, the PRESIDENT thus spoke:—

"The Patron's Medal for this year has been awarded to Mr. R. B. Shaw, for the services he has rendered to the cause of Geography in exploring Eastern Turkistan, and above all for his very valuable astronomical observations, which have not only enabled us to fix the longitude of Yarkand, but have afforded a general basis for a map of Kashgaria. Mr. Shaw, travelling at the same time as, though quite independently of, Mr. Hayward, actually reached the cities of Yarkand and Kashgar in 1869, some weeks before that gentleman, and if our awards had been regulated by mere priority of arrival, he would thus have borne away the prize from his fellow-traveller when the question was first considered; but Mr. Hayward at that time was to a certain extent the Agent of the Society, and he had moreover presented us with the first accurate scientific information regarding the country of Turkistan, so that we decided to give his claims the preference, without, however, in any way disparaging those of Mr. Shaw. Since 1869 Mr. Shaw, however, has a second time visited Yarkand in company with Mr. Forsyth, having been summoned from England for the purpose; and it is mainly for the result of this second expedition that the Medal is now awarded him. Sir Roderick Murchison, in his last Anniversary Address, described in such glowing terms the great geological and geographical value of the survey of the country between the high tablelands at the head of the Karakash River and the valley of the Upper Shayok River, which was executed by Mr. Shaw on his return from

the Yarkand Mission, and which will be found in the forthcoming volume of the 'Journal,' that any commendation of the work from myself would be superfluous; but I may say that it is that remarkable survey,—together with his Register of Observations for Longitude, Latitude, Variation of the Compass and heights of places above the sea-level, which with the necessary calculations extend over 21 pages of the 'Journal,'—that has chiefly influenced us in awarding our Gold Medal to this enterprising and accomplished traveller: while we cannot also but recognize that Mr. Shaw has done good service to general Geography by his popular account of High Tartary, which for the first time has familiarized the British public with those countries beyond the Thibetan frontier that are destined, probably ere long, to play an important part in the history of the East. I am desirous to add that Mr. Shaw, mindful at all times of the interests of the Society, has, since he took up his abode at Leh, in Ladakh, where he has been installed as Commissioner in acknowledgment of his Turkistan services, busied himself in collecting geographical information regarding the adjoining countries. That information, in so far as it is embodied in itineraries leading from the Himalayas to Turkistan, and from Yarkand to Pekin, has been already submitted to us, and proves to be of great value for the better understanding of the physical geography of Central Asia, thereby furnishing Mr. Shaw with an additional claim on our favourable notice.

"My predecessor in this chair was careful to explain that in awarding our Medals we were governed by Geographical considerations alone, and I trust that under my Presidency we shall always adhere to that principle; but there is no concealing the fact that, in the case of Mr. Shaw, the geographical value of his explorations is greatly enhanced by the uncertainty which hangs over the political future of the country he has explored; for it cannot be overlooked that as Russia has lately recovered for China, from the Mahommedan rebels, the alienated province of Dzungaria, so may a similar policy at any time be declared in regard to Kashgaria; and if Russian troops were thus to occupy Kashgar and Yarkand as they have occupied Kuldja, they could not, of course, be withdrawn until the Chinese were prepared to take their place; so that our feudatory of Cashmere might be brought into continued, though not perhaps unfriendly, contact with his great Northern neighbour. It is the interest attaching to this possible state of affairs, and its importance to our British-Indian Empire, that invests Mr. Shaw's travels with

particular value at the present time, and makes him, in fact, the hero of the hour."

Turning to Mr. R. B. Shaw, the President continued:—"I am delighted to find, Sir, since I drew up this brief recapitulation of your geographical services, that you have arrived in England, and are thus able in person to receive from me the Medal you have so well earned by your travels and researches in Central Asia. I congratulate you, Sir, on your return to your native land at such an auspicious moment, when you can enjoy the triumph of being one of the Geographical Prizemen of the year. I present you, Sir, with this Medal as a token of the warm admiration with which all geographers must regard your past career, and in the hope that it may serve as an incentive to similar exertions in the future."

Mr. R. B. SHAW then replied:—"I feel unable adequately to thank the Society for the high honour they have done me in presenting me this Medal. This is the reward which geographers and explorers hold in encouraging prospect in all parts of the world, during the many hours of tedium and discouragement which they often have to endure. I am glad of this opportunity of publicly expressing my regard for the memory of the lamented Hayward, who was indeed worthy the Medal which was bestowed on him two years ago by this Society; and I deeply regret that this intrepid traveller did not live to receive from the President's lips that praise which would have been accorded to him. He was a worthy agent of the Royal Geographical Society, a Society whose representatives penetrate each year into regions to which no civilized governments have yet sent their agents. In early times it was commerce that prompted the greatest journeys, and public policy has since then opened up large tracts of country; but it is the glory of the Royal Geographical Society, that, without motives of gain or policy, and solely in the interest of science, it carries out explorations which rival those of the missionaries of religion, the great pioneers of geographical discovery. Eastern Turkistan is a conquest of the Royal Geographical Society. Hayward I have already mentioned. Forsyth, Henderson, Cayley, are all distinguished members of the Society. When I left Yarkand for the first time, the Governor of that province parted from me with these words, 'You have opened the door of communication between Turkistan and England, and, please God, it shall never be shut again.' All present will echo that hope, and join me in the wish that Central Asia may be the field in which many more may labour who will be candidates for

these Medals, which constitute the highest honour held out to the ambition of the Geographer."

OTHER AWARDS.

To Commander G. C. Musters, R.N., was awarded a Gold Watch, with a suitable inscription, for his adventurous journey in Patagonia, through 960 miles of latitude, in 780 of which he travelled over a country previously quite unknown to Europeans; for his route map, and for his large contributions to our knowledge of the Patagonian people.

In presenting the Watch to Mr. J. C. Musters on behalf of Commander G. C. Musters, R.N., the PRESIDENT said:—

"In the absence of Commander Musters, who is now travelling in North America, I have great pleasure in handing to you, for transmission to that gentleman, this testimonial of the Society's approval of the courage and ability with which he carried out his wonderful journey through Patagonia. It will be in the memory of most of the frequenters of our Evening Meetings, that an account of this great geographical exploit was read during the previous Session of the Society, since which a more detailed narrative has been published as a book of Travel. The boldness with which Mr. Musters ventured into the heart of this inhospitable country, trusting his life in the hands of savages hitherto spoken of as pre-eminent for their hostility to the white man, and in their company traversing the whole unknown region at the eastern foot of the Cordillera for nearly 1000 miles, could not be passed over by the Council of the Royal Geographical Society without some mark of their approval, such as the present, the more especially as considerable additions have been made to our knowledge of the geography, meteorology, and ethnology of this remarkable country."

Mr. J. C. MUSTERS replied:—"I sincerely regret that my brother, Commander Musters, is not present, to express in person his gratitude for the great honour done him by the Council of the Society. It would be, if possible, a still greater inducement to him to continue his travels and explorations in parts of South America which have hitherto been but little known. I believe he is at the present time travelling in North America, and it is to be hoped that on his return he will be able to add something to our geographical knowledge of that part of the world."

The sum of 25*l.* was awarded to Herr Karl Mauch, in acknow-

ledgment of the ability and zeal with which he has devoted himself, for a series of years, with very limited means, to the exploration of South Eastern Africa; during which he has fixed the position of many places, and traced the course of numerous tributaries of the Limpopo and the Zambesi, besides discovering the South-African gold-fields and ancient ruins in the same region.

The PRESIDENT then presented the sum of 25*l.*, awarded to Herr Karl Mauch; Baron Von Schmidthals, German Secretary of Legation, attending to receive it on his behalf. He said:—

"The Council of the Royal Geographical Society have awarded this sum, as an acknowledgment of the persevering efforts which Herr Karl Mauch has made, during a period of seven years, to extend our knowledge of the interior of South-Eastern Africa. Landing at Natal, almost destitute of means, this enthusiastic and determined explorer has gradually worked his way northward to the almost unknown region lying between the lower courses of the Limpopo and Zambesi rivers—the region of the semi-fabulous places, Monomotapa and Maniça, and the gold-fields of the early Portuguese explorers and writers. In this neglected portion of Africa, lying far to the east of the route of ivory-hunters and travellers, Herr Mauch has succeeded not only in re-discovering the abandoned gold-district whence the Portuguese, and doubtless the Arabs before them, even as far back as the remotest antiquity, derived their East African gold, but has brought to light the ruins of an ancient city, revealing, by the massiveness of its walls and towers and its sculptured stones, the former existence here of a foreign civilized people, long anterior to the arrival of the Portuguese. These explorations have been carried on by Herr Mauch year after year, by repeated attempts and amid many privations; nor has he neglected to fix by exact observations the position of all the more important points, the courses and width of the numerous rivers, and the altitude of the table-lands over which his travels have been chiefly directed, above the level of the sea. I trust, Sir, that in conveying this small mark of our approval to Dr. Petermann, of Gotha, the chief correspondent of Herr Mauch, who will remit it to him, you will express the great interest with which myself and the Council of the Royal Geographical Society watch the career of this meritorious traveller."

Baron VON SCHMIDTHALS thanked the President and Society in the name of Karl Mauch.

PUBLIC SCHOOLS PRIZE MEDALS.

Mr. FRANCIS GALTON (Vice-President, and Chairman of the Public Schools Prizes Committee) made the following statement of results of the Examination for 1872:—"As Chairman of the Prize Committee, I have the honour to address you on the results of the competition just concluded. I need not touch on matters of detail, as they are contained in the pamphlets which lie on the table.* The distribution, and the names of the successful candidates, have been already announced from the Chair, at the last Meeting of the Society. But I wish to speak on the general results, for they are matters of much satisfaction to all of us. This is the fourth year since the Medals were established. Every year has furnished boys worthy to receive them, and an increasing number of well-prepared candidates yearly enter the lists. During the first two years the candidates who presented themselves were numerous; but, though a few did themselves great credit, our Examiners reported that many did not. Those reports of our Examiners were published, and had a salutary influence in weeding future lists, but of course they had the immediate effect of reducing the gross number of competitors. It was in the lists of last year that this influence was felt: the candidates were few, but nearly all were well prepared. Now, as regards this present year, I have the great pleasure of announcing, that while the average material is at least as good as it was last year, the number of competitors is nearly twice as great. Eleven great schools, all of high eminence, have furnished candidates; and as many as 24 picked boys have competed in Physical Geography, and 14 other boys in Political Geography. I cannot forbear to mention a subject of genuine satisfaction to us,—that Eton has at length joined in the competition, and done so with signal success. I must add that, after so much geographical effort had been called by us into existence, I strongly felt it was a little hard upon the boys who had not gained the very foremost places, but whose absolute merit was such as to earn 'Honourable Mention' from the Examiners, and who therefore had achieved what I may call

* The successful candidates for the year are the following:—

PHYSICAL GEOGRAPHY.—*Gold Medal*—S. E. Spring Rice, Eton College. *Bronze Medal*—A. S. Butler, Liverpool College. *Honourably Mentioned*—C. Penrose, Haileybury College; E. Dickson, Cheltenham College; J. R. White, Liverpool Institute; H. De Vere Vane, Eton College.

POLITICAL GEOGRAPHY.—*Gold Medal*—W. Gershom Collingwood, Liverpool College. *Bronze Medal*—W. C. Graham, Eton College. *Honourably Mentioned*—R. H. Sayle, Uppingham School; W. L. Kingsford, Rossall School; Henry Elliot Dixon, Rossall School.

a 'First Class' in Geography, that they should receive from us no substantial recognition to keep and show, with just pride, now and in after life. I therefore have sincere pleasure in announcing that the Council have agreed, on the present occasion, to award and send a handsome Atlas to each boy, including the Medallists, who has been named with distinction by the Examiners. These Prize Atlases are eleven in number, and their total cost to the Society is about 30*l*. I believe this to be a just and very wise expenditure of our funds, thoroughly in accordance with the objects of the Society, and I hope and believe it will meet with the approbation of the Meeting. The agreeable duty remains to me of calling on the Examiners, Mr. Bates and Mr. Hinchliff, to present the Medallists to our President, to receive from his hands their rewards."

After Mr. F. Galton's Address, the PRESIDENT said:—

"I am sure the Meeting must have listened with interest and pleasure to the observations which have just been addressed to us. To the Council of the Society the facts which Mr. Galton has recorded have afforded unmixed gratification, for we have laboured long and earnestly to introduce a systematic and scientific study of Geography into the education of the rising generation, and we think that we now see our way to a successful issue. When we commenced our agitation four years ago, Geography in most of the public schools, if taught at all, was taught in such a perfunctory manner that it could not lead to any results. Now, however, we see eleven of the leading schools of the country all sending scholars to compete for our Prizes; and it is reported by the Examiners that no inferiority in regard to the system of instruction pursued in any of these schools can be detected from the Examination Papers. That so many of our great educational establishments should thus have simultaneously introduced an improved system of teaching Geography, amply repays us for our exertions; and we are further gratified by observing that the colleges of Eton and Liverpool stand this year at the head of the list. I do not wish in any way to disparage the schools which have not thought fit to compete, or which, having competed, have not gained prizes, but I cannot the less congratulate Eton and Liverpool on their success. I am especially pleased to see Eton taking the lead, because, as the nursery of our statesmen, the school necessarily exercises an important influence on the fortunes of our country; and because, also, in the traditional head-quarters of the severest Classicism, this introduction into the curriculum, of a popular but most useful element

of education is an enormous stride in advance, and bears the strongest testimony to the enlightened and judicious views of the present head-master, Dr. Hornby. Nor am I less pleased that Liverpool College, the great educational centre for the mercantile classes, on whom our national greatness so largely depends, should have sustained the high reputation it had already gained, and should take the next place to Eton in the competition; and I trust that Dr. Butler will continue to send us scholars, who, in future years, will try the mettle of all comers, and bear off their full share of prizes."

In presenting the GOLD MEDAL for *Physical Geography* to S. E. Spring Rice (Eton), the President said:—"I have much pleasure in presenting to you the Gold Medal which you have gained in the Examination for Physical Geography. You belong, Sir, to a family which has been ennobled for its services to the State, and which is as distinguished for talent and ability as for its devotion to the public interests. I feel assured, Sir, you will not do discredit to your ancestry; I further congratulate you on having been the first to gain for your fine old school, of which all Englishmen are proud, the chief Geographical Prize of the year. I trust you may have many imitators, and that your present success is but an earnest of what Etonians will do in the future."

The GOLD MEDAL for *Political Geography* was then presented to W. G. Collingwood (Liverpool College) by the President, in these words:—"It is highly creditable to you that, having last year gained the Bronze Medal for Physical Geography, you should this year be awarded the Gold Medal for your superiority in Political Geography. Learning the probability of your following the profession of your distinguished father, I am reminded of an observation made by the President of the Royal Academy at our last Anniversary Dinner, that a knowledge of Geography was not less important to Artists than a knowledge of Art to Geographers. Combining as I trust you will, the Artist with the Geographer, you will in each capacity possess the supplemental knowledge recommended by Sir Francis Grant."

On presenting the BRONZE MEDAL for *Physical Geography* to A. S. Butler (Liverpool College), the President said:—"It is only two years ago, Sir, that my predecessor in this Chair presented to your brother our first prize, the Gold Medal for Physical Geography; that you should so soon afterwards have achieved an almost similar success bears the strongest testimony both to your family talents

and to the admirable system of instruction pursued in the Liverpool College. I cannot help observing that the singular concatenation of educational pre-eminence and ability belonging to the Butler family affords an apt illustration of Mr. F. Galton's theory of 'Hereditary Genius.' You are the second Butler, and the sixth scholar educated under a Butler, who has carried off one of our Geographical Medals in the short space of four years, during which we have held examinations. I congratulate you on the honour which you have done both to yourself and to your college."

The President then gave the BRONZE MEDAL for *Political Geography* to W. C. Graham (Eton), and said:—"I am happy to have to present on this occasion a second Medal to an Etonian, and I feel it is all the more creditable to Mr. Spring Rice and to yourself that you have gained this distinction, since you appear to be the two youngest boys in the whole list of competitors. I wish you every success in your future career."

The Hon. G. C. BRODRICK then addressed the Meeting on this subject:—

"It is a subject for special congratulation, that, while the number of candidates this year is very much greater than last, there is no falling off in quality. I cannot help also congratulating this Society, as well as the Head Master of Eton, on the prominent and distinguished position taken by that school; for where Eton takes the lead, no other school need be ashamed to follow. When this competition was originally started, it was a matter of consideration with the Prize Committee whether it should be confined to a small number of schools, or be extended, as it has been, to a large number. I am glad that the latter course was adopted, because it adds greatly to the importance of the Prizes, and enhances the honour of success. An idea had been entertained by some persons, that there might be a certain feeling of exclusive superiority in some of the great schools, which would prevent their coming forward to compete. I have, however, been convinced, from the first, that that is an entire mistake. The present are not days in which a few schools, however eminent, can monopolise to themselves — or even desire to monopolise — any superiority of learning. The older, and what used to be called the great Public Schools, are perfectly willing to meet their junior competitors in the field of contest. They are not ashamed to be sometimes beaten; and when they are

fortunate enough to win, they are all the prouder for their success, because it has been won in open, free conflict. Almost the only difficulty the Committee has had to contend against in extending the range of these Examinations, is a kind of feeling that preparing pupils for these competitions may rather prejudice their success in the usual Classical examinations. I speak from experience when I say that the time expended in preparing for the Geographical examination is by no means wasted, even as regards University Scholarships, or other Classical examinations at Oxford or Cambridge. And not only so, but we must remember that a great change has come over the Public Schools themselves; and they have learnt to recognise the existence of a great many boys who are not destined to succeed in, and have little taste for, Classical studies. These were formerly allowed to remain almost uncared for, and too often very idle; but they are now tempted, by the greater variety of subjects recognised in public school education, to exert themselves, and to acquire some intellectual training. In addition to modern languages, of which the value is generally acknowledged, I believe the study of Geography, as encouraged by the Royal Geographical Society, has been of very great, and will be of very permanent, advantage. I consider the Committee have been very fortunate in their selection of a subject for next year. That of last year had no interest attached to it connected with ancient history; but Eastern and Western Turkistan have been famous, politically and historically, from the earliest ages. Not to go back to the Garden of Eden, though some persons think it was situated not very far from Bokhara, it will be remembered that Western Turkistan was traversed by Alexander the Great in one of his marvellous campaigns after his conquest of Persia. This fact should make people hesitate before they say it is impossible for modern armies to penetrate the fastnesses of the mountain ranges of Central Asia. During the middle ages it was from the same province of Western Turkistan that Genghis Khan and Timour issued forth to found those great Asiatic empires, of which Turkistan always continued to be the nucleus. This province was also, if not the birthplace, at all events the resting-place, of the Turks, who afterwards overran Western Asia, took Constantinople, and penetrated far into Europe. In modern times, likewise, a great interest belongs to this region in consequence of the progress of Russia in Central Asia, whence she is ever pushing forward her frontier eastward and southward towards our own Indian Empire."

ADDRESS

TO

THE ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 27th May, 1872.

By Major-General Sir Henry C. Rawlinson, K.C.B., etc., President.

Gentlemen,

I open my Address by expressing, on behalf of the Royal Geographical Society, our warmest thanks to the Chancellor and Senate of the University of London for their liberality in having permitted us during the past year to hold our Meetings in the noble Theatre where we are now assembled. It has not been by any means as a matter of course that this privilege has been granted us. On the contrary, we must consider ourselves to have been very specially favoured; for the Senate, embarrassed by a multitude of applications from various quarters for leave to hold public meetings in their Hall, were obliged to pass a resolution, restricting its use to meetings connected with educational purposes; and it was merely in consideration of the very high position which we occupy in public estimation and in general utility that we were last year exempted from the operation of this rule, and were permitted to continue to make use of the premises. Let us hope that, as we have certainly not derogated from that high position, either in the numbers and influence of our members, or the high character of our papers, or in the degree of national importance attaching to the objects to which our attention has been directed, the same exceptional favour may be extended to us in future, and we may be allowed to continue our discussion of questions of great popular interest in this Hall.

I have in the next place, Gentlemen, to congratulate you on having at length obtained a substantive footing in this great Metro-

polis. Instead of being mere lodgers, living from hand to mouth and paying our way as we go on, the Fellows of the Royal Geographical Society of London are now the possessors of an unencumbered freehold property in this neighbourhood, which has cost nearly 20,000*l*., and would at any time realize that amount in the public market. A Committee, presided over by Mr. James Fergusson, was charged by the Council with the duty of preparing the new premises for our reception, and of superintending the removal of our collections from Whitehall Place to Savile Row; and they have discharged their functions in so efficient a manner, that we are now probably more commodiously established than any other scientific body in this Metropolis. Ranged in cases on the floor of our capacious Map-room, which has been formed by covering in the court-yard of the house, and which measures 60 feet in length by 40 in breadth, we have now at our command over 60,000 Maps; and, what is of equal importance, we have ample room to exhibit the maps to all who desire to consult them. As the intention of the Government, in granting us a subsidy of 500*l*. a year, was to provide a Map-office for general reference, it is satisfactory to know that we are thus in a condition to acquit ourselves thoroughly of the responsibilities which the grant imposed on us; and I may add, as an illustration of the extent to which we have already discharged these duties, that, according to a return recently required by Parliament, and which has just been sent in, we find that during the last ten years the rooms of the Royal Geographical Society have been visited by 45,334 persons, and the evening meetings attended by 55,300, making a total of 100,634 persons, who, during the period in question, have derived instruction from our maps, books, and papers. Although we have not hitherto aimed at obtaining the same completeness for our Library as for our Map-room, we are still —thanks to the liberality of many Geographical friends, among whom I would especially notice Mr. Kenneth Murchison, the heir and executor of our late estimable President—in a position to place at the disposal of the Fellows of the Society as large and well-assorted a collection of Geographical works as is to be found in Great Britain. The number of volumes, indeed, ranged along the galleries of our Map-room and in the various apartments of our new premises exceeds 20,000, and as funds become available we intend to fill up the lacunæ in every department, so that our Library may become a real repertory of Geographical science.

OBITUARY.

Our Obituary List for the past year has been unusually heavy, and not in numbers only, but in worth. First and foremost, we have to deplore the death of one to whom the Society was more indebted, perhaps, for its position, both in popular estimation and among the scientific bodies of England, than to all its other members collectively. I need hardly say that I refer to our late President, SIR RODERICK MURCHISON. It would be out of place, in a mere obituary notice, to attempt to trace in any detail the various incidents of Sir Roderick's long and distinguished career. That career belongs to the pages of our national history, and will moreover receive ample justice at the hands of the tried friend and skilful writer who was appointed by Sir Roderick's will to be his biographer and literary executor. Here it will be more suitable to draw attention to his special merits as a geographer, and to point out his close connexion with this Society.

Sir Roderick belonged to an old Highland family, which, like many others, had been impoverished by its loyalty to the Stuarts. His father, however, retrieved the fortunes of the house by a successful service in India under Warren Hastings, and subsequently purchased a property from the Mackenzies in Ross-shire, where he settled, and where his eldest son, Roderick, was born in 1792. After a rapid course of study at the Durham Grammar School, the Military College at Marlow, and the Edinburgh University, Mr. Murchison joined the army in Portugal in 1808, and pursued his military career to the close of the war, having served in the three actions of Roliça, Vimeira, and Corunna. In 1815, at the suggestion of Sir Humphry Davy, he began to turn his serious attention to physical science. In 1825 he wrote his first geological paper, and from that time forward, for a continuous period of nearly fifty years, he was one of the most assiduous and successful cultivators of geological science that this country has ever seen. To recapitulate his labours in this one department of science would be to fill a volume. He personally examined the geology of not only every district in Great Britain, but of almost every country in Europe, and of some part also of Asia. His discovery of the "Silurian" system made his name famous through the world, and his subsequent exposition of three other systems, to some of which he gave names, the Devonian, Permian, and Laurentian, confirmed and increased his reputation. His papers, indeed, on

these subjects, independently of his great works on Siluria and on the geology of Russia, are said to exceed 100 in number; and it is no doubt as a geologist—sound, cautious, and eminently practical—that the name of Murchison will descend to posterity. In his later years, however, he took more interest, perhaps, in geography than in geology. He was proud, and justly proud, of the share he took in founding the Royal Geographical Society in 1830. In his Anniversary Address for 1865, he explained to us, in much interesting detail, how he was associated with Mountstuart Elphinstone, John Cam Hobhouse (the late Lord Broughton), and Robert Brown, in drawing up, under the guidance of Sir John Barrow, those laws by which the Royal Geographical Society has ever since been governed; and although his name does not appear in the original lists of Councillors (owing probably to the preoccupation of his time with geological matters), his claim to the first place in the establishment of the Society was fully recognized and authenticated in the Charter of incorporation which he obtained for the Society from the Crown in 1859. During the latter half of Murchison's life, as has been well said, the history of his connexion with the Royal Geographical Society is in fact the history of the Society itself. He was placed on the Council in 1831, and became a Vice-President in 1836. In 1843 he was first elected President, and he subsequently occupied the Chair at intervals for fifteen years. His tenure of office, indeed, was continuous for the last nine years of his life; the regulation which provides that the President shall be changed every second year having been suspended in his favour, in deference to his extraordinary fitness for the post. But the mere record of our late President's official duties conveys a very inadequate idea of the services which he rendered to the Society. When Murchison, in 1843, was elected to the Chair, we were a struggling body. Our numbers were limited to 650 members, and we had certainly not achieved any high literary or scientific eminence. Murchison's opening Anniversary Address, delivered in May, 1844, was remarkable in many respects. For the first time, with a bold hand and comprehensive grasp of thought, he reviewed the progress of Geography over the whole extent of the globe, and thus furnished a model, which has been followed, with more or less closeness, by all his successors. But this Address, ample in its scope, and admirable for its sound reasoning and extensive knowledge, was also especially memorable from its containing the first allusion to

the Gold Fields of Australia. Murchison, who had then just returned from examining the Ural Mountains, was struck with the close resemblance between their geological formation and that of the great Australian chain, which had been reported on at about the same period by Count Strzelecki; and he accordingly expressed his surprise that the latter region had, as yet, offered no trace of gold or auriferous veins,—the fact being that gold had actually been at that time discovered by the Count in Australia, but that the discovery had been purposely concealed, in deference to the views of Sir George Gipps, the Governor, who feared that society would be disorganized and the fortunes of the infant colony ruined by a sudden rush to the mines of the pastoral and agricultural settlers. The more, however, that Murchison studied the geology of Australia, the more convinced he became that gold must exist there, and in the course, accordingly, of the next few years, he expressed that conviction on three different public occasions: in a Memoir read before the British Association; in a lecture delivered at the British Institution, and finally, in an article in the 'Quarterly Review' for 1850, entitled 'Siberia and California.' The realization of these views was first achieved, as is well known, in 1851, by the practical operations of Mr. Hargreaves; but the delay which thus occurred in opening up the Gold Fields neither impugns Strzelecki's credit as their first discoverer, nor detracts from Murchison's merit in having proved their necessary existence under the guidance of a sound induction. From this time forward Australian Geography occupied much of Murchison's attention, and he was ever ready to co-operate with the colonists in pushing exploration into the interior of the continent. Under his auspices, or at his suggestion, twelve Australian travellers — including Strzelecki, Sturt, Leichhardt, Macdouall Stuart, O'Hara Burke, &c.—received honorary rewards from this Society; and he had the satisfaction, in his last Address, of pointing out that, whereas in 1830 nothing was known of Australia beyond a small area around Sydney, above two-thirds of the continent is now occupied by settlers, and a telegraphic wire has been stretched nearly across from the southern to the northern coast, along a line measuring about 1800 miles.

But Murchison's best known geographical exploits were connected with Arctic exploration on the one hand, and with African discovery on the other. Being in the Chair of the Society when Franklin quitted England in 1845, he took an almost personal interest in the fortunes of the expedition; and when, accordingly, the *Erebus* and *Terror*

were lost sight of, he made it the business of his life to ascertain their fate. He never ceased, indeed, to stimulate public interest in the matter by the most urgent and moving appeals, until at length the mystery was solved by the successful voyage of the *Fox* under Sir Leopold McClintock in 1857. In the same spirit Murchison adopted and made his own the great field of African discovery. Having satisfied himself, at a very early period of his researches, that the interior of the continent was an elevated plateau,—giving rise to great rivers like the Zambesi, the Congo, and the Nile, which flowed to the east, to the west, and to the north, almost from a common centre,—instead of being a mere sandy desert, according to the old and popular belief, he encouraged and assisted to the utmost of his power the various travellers who were prepared by personal observation to investigate and determine this important fact in Physical Geography. Livingstone, Burton, Speke and Grant, Du Chaillu, Beke, and, lastly, Sir S. Baker, all thus, in turn, received Murchison's warmest sympathy and support. It will ever be remembered that, when intelligence reached England in 1867 of Livingstone's death near the Lake Nyassa, Murchison, almost alone, refused to believe the statement, observing, as he did, with equal boldness and acumen, that the Johanna men, on whose authority the statement was made, were especially interested in disseminating a false report. It was on Murchison's urgent requisition that Young's expedition was sent out by the Government to investigate the story on the spot; and our venerable President had his reward in the universal joy and gratitude with which an exposure of the lie was hailed by the British public. Murchison's confidence in the endurance and good fortune of his friend remained unabated to the last; and it is only just to his memory to say that, if the present expedition should succeed in rescuing Livingstone and restoring him to his admiring countrymen, it will be due, not so much to the spontaneous action of the Geographical Council, as to the hopeful spirit and the deep sense of national duty which they derived from the tuition and example of their late noble-hearted President.

Among the more substantial benefits conferred by Murchison on the Geographical Society, must be enumerated, firstly, the valuable assistance which he rendered in obtaining from the Government, in 1854, the grant of an annual subsidy of 500*l.*, on condition that a public map-office was established in the Society's rooms for general reference; and, secondly, the issue of a Royal Charter of incorpora-

tion in 1859, which declared Sir Roderick Impey Murchison, by name, to have been mainly instrumental in establishing the Society, and further provided that he should be "the first President of the said body politic and corporate." The Bellot Testimonial Fund also, which was originated by Murchison, added much to the reputation of the Society, in showing that the geographers of England appreciated true merit wherever it was found, irrespective of national distinction.

But Murchison's services were not confined to the special departments of geology and geography. In assisting to found the British Association in 1830, and in the long course of assiduous care with which he attended its meetings and in his position of Vice-President directed its proceedings, he rendered an important service to the cause of general science. As the Director-General of the Museum of Practical Geology and Chief of the School of Mines, to which posts he was appointed by the Government in 1855, on the death of Sir Henry de la Beche, he had the further opportunity of introducing scientific training into the education of the working classes; and the recent report of the Commission on the coal resources of the country, for which he was mainly responsible, must be regarded as a work of real national value.

It has often been a reproach to the Government of this country that scientific services are, as a rule, so little regarded and so poorly rewarded; but Murchison's career furnished a bright example to the contrary. He was knighted in 1846, was made a K.C.B. in 1863, and a Baronet in 1866. From the other sovereigns of Europe he also received a shower of well-earned honours. By the Emperor of Russia he was made a Knight of the 2nd Class of St. Anne, and subsequently a Grand Cross of the same order, and also of that of St. Stanislaus; and as these honours were conferred for services rendered to the Russian Government, he was graciously permitted to accept them, and wear the crosses and insignia at the British Court. Orders were also conferred upon him by the sovereigns of Sweden, Denmark, Italy, and Brazil. A list, indeed, has been lately published of nineteen stars, crosses, and other emblems of distinction which belonged to Sir Roderick at the time of his decease, and which constitute, as has been said, "the largest number of "honorary decorations which in modern times have been awarded "by crowned heads to any individual for purely scientific attain-"ments."

By the public and scientific bodies of this country and of the Con-

tinent he was further rewarded with a similar profusion of titles and honours. He was a D.C.L. of Oxford, LL.D. of Cambridge, and M.A. of Dublin. Of the Royal Society he was not only a Fellow, but also a Vice-President, and had further received from it the Copley Gold Medal. Amongst similar first-class scientific prizes, he had been awarded the Brisbane Gold Medal from Edinburgh, the Prix Cuvier from Paris, and the Wollaston Medal from the Geological Society of London. He was a member of the Academies of St. Petersburg, Berlin, Copenhagen, Brussels, Stockholm, and Turin, and a corresponding member of the Institute of France. At home, at the time of his death, he was Vice-President of the Geographical and Geological Societies, a Trustee of the British Museum, of the Hunterian Museum, and of the British Association for the Advancement of Science, an honorary member of the Royal Society of Edinburgh and of the Royal Irish Academy, President of the Hakluyt Society, Fellow of the Linnean Society and of many other scientific bodies.

It will be further in the recollection of the Fellows, that when Sir Roderick found himself compelled last year, owing to a stroke of paralysis, to retire from the Chair of this Society, which he had then occupied for nine consecutive years—and when it was proposed in consequence, in the Geographical Council, to present him, on his retirement, with some testimonial in acknowledgment of his distinguished services—he caused us to be informed "that he would prefer to any testimonial, however costly and elaborate, the simple gold medal which he had himself so often presented to others as the reward of merit." This was the last distinction conferred on him by any scientific body; and he assured me that, looking on the Society almost as the child of his creation, he valued our humble tribute of admiration and respect above all the more brilliant trophies which filled his cabinet.

Sir Roderick Murchison, on his retirement from the Army in 1815, was united to the only daughter of the late General Francis Hugonin, and he subsequently passed fifty-four years of married life with this estimable and cultivated lady. He only survived her, indeed, a little more than two years, and was laid beside her in the Brompton Cemetery on October 27, 1871. At Sir Roderick's funeral the Prime Minister attended in person, and the Geological and Geographical Societies were amply represented.

This is not the place to enter on a critical examination of Sir Roderick Murchison's character, either as a man or a philosopher;

but I cannot avoid noticing some of those qualities which endeared him to his friends, while they enhanced the value of his public services. Industry and energy, a clear head, a strong will, and great tenacity of purpose, were among his leading characteristics, while his warm feelings, his thorough honesty, his kindness of manner, his entire absence of jealousy, his geniality, fine temper, tact and firmness, peculiarly fitted him to preside over public bodies, and to lead his followers to good and useful ends. Many a young student of science has been led to persevere and succeed by Sir Roderick's encouragement and help. Many a young traveller has been sustained under his hardships by Sir Roderick's hopeful counsel. Sir Roderick, indeed, never deserted a friend in need. At one time he might be seen urging the Government to send out expeditions to search for Franklin; at another he would be energetically defending Governor Eyre, an old medallist of the Society, from what he regarded as persecution. When Speke and Grant were supposed to be in difficulties in Africa, he was active in organizing relief. He was ever a steady supporter of Sir Samuel Baker; and with Livingstone his name is so identified, that when the great traveller returns—as return he assuredly will—the only feeling of regret will be that Sir Roderick will not be here to welcome him.

Sir Roderick died, full of years and honours, on October 22, 1871. His care for his two favourite Societies—the Geographical and Geological—continued to the last; a legacy of 1000*l.* being bequeathed to each of them, to be expended in such manner as the two Councils might consider best for the advancement of their respective sciences. No one is better able than myself to appreciate the heavy loss which the Royal Geographical Society has sustained in the death of Murchison, because no one can more acutely feel my entire inadequacy to supply his place. In the mean time, while I humbly follow, *longo intervallo*, in his footsteps, I can only beg the Society to join with me in doing honour to his memory.

JOHAN AUGUST HAZELIUS, an Honorary Corresponding Member of our Society, was born in Stockholm on the 18th April, 1797. His father was Johan Hazelius, a wealthy merchant of that city.

He became an officer in the Engineer Corps in 1814, and took part in the short campaign in Norway. He won several prizes in the Academy of Military Science, became a member, and was for 20 years its secretary. He was adjutant to King Oscar for several years; was appointed to a Professorship in the "First Military

School," was made Chief of the Topographical Corps in 1856, and Major-General in 1860. He became a member of the Royal Geographical Society in 1858, and died on the 28th April, 1871.

Hazelius extended his labours in many useful directions. That which fully entitled him to his nomination as member of the Royal Geographical Society was his exertion to continue the publication of the topographical maps of his own extensive country. Since he was appointed Chief of the Topographical Corps an immense number of carefully and tastefully executed maps have been issued, contributing in a great degree to the geographical knowledge of the Scandinavian Peninsula.

He was also prominent as a political writer. He belonged to the Liberal-Conservative party, and, by his calm discussion of complicated questions, delayed the pushing forward by the Liberals of precipitate resolutions, and opposed the tenacious clinging of the Conservatives to old abuses. He exercised for many years a strong influence on the Government of his country by his political writings, and was, at his death, a member of the Upper Chamber of the national representatives.

He was also zealous in his endeavours to improve the instruction given in the national and grammar schools of Sweden. He wrote much on this subject, and was at the time of his death President of the Board of the New Elementary Schools in Stockholm.

His style of writing was subtle, and, at the same time, entertaining; his reasoning clear and convincing, and he preserved the activity and freshness of his mental powers down to a ripe old age.

Captain JOHN WOOD, late of the Indian Navy, died in London on the 13th November, 1871. He was born in 1812, and educated at the Perth Academy. When very young, Captain Wood joined the Indian Navy, a service fruitful in distinguished names, where his zeal and skill as a surveyor soon brought him prominently forward, and much of his work in this respect remains our standard authority in regard to the countries he mapped.

Captain Wood's name is, however, chiefly associated with the rivers Indus and Oxus. As far back as 1835 he commanded the first steamer that ever floated upon the celebrated waters of the former river; and the maintenance upon it of late years of a fleet of steamers which are employed commercially, and in times of political emergency have more than once done most valuable service, is mainly due to his care and experience.

It is, however, particularly in connection with the Oxus that

John Wood's name is known to fame. In company with Sir Alexander Burnes he proceeded to Cabool on a mission from the Indian Government in 1839, and, leaving his chief there, crossed the Hindu Kush to Kunduz; thence, undeterred by many difficulties, he held his way till he reached one of the sources of the great River Oxus, in the wonderful table-lands of Central Asia, for which brilliant exploit he received the Patron's Medal of our Society in 1842.

Retiring early with a well-earned reputation, Captain Wood visited many of our colonies, leaving his mark for good wherever he remained for any time, and, after a long and honourable career in Sind, the scene of his early usefulness, he returned to Europe last year, hoping to enjoy the repose to which he had long looked forward. Unfortunately, however, a journey to Simla, undertaken before leaving India at the height of the hot season, prostrated him to such an extent that he never fully recovered, and he only survived his return to England fourteen days.

Captain Wood's great characteristic was an extremely retiring disposition, in him amounting to second nature, which often prevented his coming before the world so prominently as his friends desired; but those who had the privilege of his friendship entertained the greatest regard for his character, and the thanks of the Government of India have on several occasions been bestowed on him in testimony of his worth as a public servant. His death was mourned by a wide circle both here and in the East, and, in commenting thereon, the Indian papers remark that no man has died of late years, whose loss has been so much felt in Western India.

It is gratifying to know that a second edition of his work, entitled 'Narrative of a Journey to the Source of the Oxus,' is about to be published by his son, with an introduction from the pen of Colonel Yule, which will no doubt do justice to Captain Wood's great merits as a discoverer; while it traces the further progress of discovery in the Oxus Valley from his time up to the present day.

GENERAL CHESNEY.—The Society has lost during the past year, in General Francis Rawdon Chesney, one of the most distinguished of its practical geographers, as well as one of its oldest members. His name will be for ever associated with the topography of the Euphrates and Tigris, from his remarkable explorations and surveys of those rivers—enterprises conducted under circumstances of extraordinary difficulty; while by his researches into the conditions of the Red Sea navigation, he was one of the first to demonstrate the

practicability of the overland route to India. It was he, too, who first detected the fallacy propounded by Napoleon's engineers, in assigning different levels to the Mediterranean and Red seas, and first pointed out, long before the project of Lesseps, that a canal without current could be opened through the Isthmus of Suez.

General Chesney was born at Ballyrea, in the North of Ireland, in 1789, and was thus in his eighty-third year when he died. He was educated at the Royal Military Academy, Woolwich, and obtained a commission in the Royal Artillery in 1805. During the Great War he was condemned by the chances of the service to garrison duty, and his first distinction was gained in January, 1814, when he took the foremost part in the rescue of the crews of two vessels wrecked in a storm on the Irish coast, himself plunging into the sea, and bringing off one of the crews to shore, and conveying a cable to the wreck, by which all hands were saved. For this action he received the medal of the Société des Naufrages. But he had reached his fortieth year without the opportunity of distinguishing himself in his profession, when, in 1829, the struggle took place on the Danube between Russia and Turkey; and in his desire for active employment, he set out for Constantinople, with the view of offering his services to the weaker side. But the peace, which he found on his arrival in the Dardanelles in process of negotiation between the warring powers, compelled him again to seek a new outlet for his activity. He took the opportunity first of visiting the scenes of the late conflict, and obtaining materials for its history; a work which, however, was not published till long after, when the better-known narrative of Major von Moltke, now the famous Marshal, had already occupied the field. He next visited Egypt, to commence his investigation of the alternative overland routes which had been proposed. He sailed down the Red Sea to Kosseir, and reported the practicability of a steam-voyage in twenty-one days between Suez and Bombay. The Report being despatched to Government, he departed on his first journey to Mesopotamia to examine the Euphrates Valley route. With characteristic energy he declined to wait for the approval of the project of survey he had submitted through Sir Robert Gordon, and embarked in the arduous undertaking without other means than those provided by the assistance of private friends. In these preliminary travels he traversed a large part of Asia Minor, Persia, and Mesopotamia, besides following the course of the Euphrates from El Kaim to Ana. The result of these explorations—conducted under great risks and

difficulties, the voyage on the Euphrates being made on a small raft supported on inflated skins—were embodied in a map and Memoir, forwarded to our Ambassador in Constantinople in June, 1831, describing about 800 miles of the great river. This expedition was conducted at Captain Chesney's own cost; and it was not till eighteen years afterwards that the personal intervention of the late Prince Consort procured the repayment from the Treasury of the actual personal outlay incurred by the explorer. Unfortunately for his fame, the results of these preliminary journeys were not given to the world till late in General Chesney's life, when a volume, commenced in his seventy-seventh year, was published at Government request.

These explorations were followed up by the well-known Euphrates Expedition of 1835,—a task made difficult not only by physical obstacles, but by political opposition, and the imperfect development of the art of constructing steam-vessels. The two exploring vessels—the *Euphrates* and the *Tigris*—were carried in sections from the Mediterranean, at enormous labour, across the desert, put together, and launched on the historic stream. As will be remembered by all, the wreck of the *Tigris*, with the loss of the most important records and instruments, and many valuable lives, was nearly putting a sudden end to the great work Colonel Chesney had undertaken. But the undaunted voyagers held on their way until the *Euphrates* emerged in the Persian Gulf; when the funds sanctioned for the purpose being exhausted, the Expedition was broken up. The commander proceeded alone to Bombay, with the view of seeking aid from the Indian Government for the prosecution of his researches; but failing to receive this, he set out for England, volunteering to take back with him the Indian mails overland. His return journey was made by way of Bussorah and Palmyra. Colonel Chesney, travelling on a camel, and attended only by two Arabs, made the passage of the Arabian Desert in twenty-two days; this alone being an extraordinary feat to perform in the hottest season of the year. From Palmyra he proceeded to England.

An account of this Expedition, the great importance of which has not been duly recognised by the world, owing, it may be supposed, solely to the immediate success of the alternate overland route by Egypt and the Red Sea, was published in the seventh volume of our 'Journal.' Its results are there summed up as follows:—"Materials for a correct map of a very large portion of Northern Syria were collected; a line of levels was carried across from the

Mediterranean to the Euphrates; Northern Mesopotamia was explored, and the grand survey of the river commenced with the descent of the steamers, and continued to its embouchure in the Persian Gulf. Besides this, two different ascents were made of the Kárún, and two descents of the Bahamishr. Twice was the River Tigris ascended to a distance of 400 miles beyond its junction with the Euphrates; a second line of levels carried between the Euphrates and the Tigris, and new positions obtained by the journeys across the desert."

The Royal Premium of our Society was awarded to Colonel Chesney for this great work in 1837, and, in delivering it to him, honourable mention was made of the other members of the Expedition, who laboured with great perseverance and rare harmony to carry it to a successful termination. Such were Major Estcourt, Lieutenants Murphy, Lynch, and Cleveland, Mr. Ainsworth, the geologist and naturalist, Mr. Hormuzd Rassam, Dr. and Mr. Staunton, and Lieutenants Cockburn, Eden, Charlewood, and FitzJames.

Colonel Chesney published in 1856, as an introduction to the account of his great expedition, two very elaborate volumes, which have since been regarded as standard authorities on the History and Geography of Western Asia.

General Chesney became a Fellow of our Society in 1838, and was created Honorary D.C.L. of Oxford in 1851. He died on the 1st of February last.

KEITH JOHNSTON, LL.D.—The presentation of the Victoria Medal to Dr. Keith Johnston in person, at our last Anniversary Meeting, must be freshly remembered by the Fellows of the Society. Scarce a month had passed after his reception of this long-coveted distinction and crowning prize of his labours before he succumbed, almost suddenly, to the effects of the unceasing toil of a lifetime. To Dr. Johnston, as he himself stated, and evidently felt deeply, the honour was enhanced by the circumstance of its being conferred upon him at the same time that a similar recognition was made of the great services of our late Chief, with whom he claimed a long-standing friendship; and one of the latest autograph letters penned by Sir Roderick Murchison, written from his sick couch with a trembling hand, was a kindly note of sympathy to the family of his deceased friend.

Alexander Keith Johnston was born at Kirkhill, near Edinburgh, in 1804. His love of geography seems to have manifested itself strongly even at school, and afterwards became the ruling and

entirely absorbing interest of his life. To geographical and other cognate pursuits he became even more devoted as he advanced in life, scarcely ever diverging to take an active part in public affairs, or to engage in political matters. His life was thus one of quiet but incessant industry, as such offering little of personal incident.

The long list of his more notable geographical works was fully given in Sir Bartle Frere's address on the presentation of the medal. His masterpiece—the 'Physical Atlas of Natural Phenomena'—will ever mark a most important epoch in the geographical history of this country, as giving the date of the introduction to it of that most interesting branch of our science—Physical Geography. Carried out at great personal sacrifice, this work brought Keith Johnston well-merited distinctions, not only from the scientific world of this country, but in the form of honorary memberships of kindred Societies in Paris, Berlin, Vienna, Petersburg, and Bombay. Baron von Humboldt, in sending his portrait to Keith Johnston, wrote beneath it in French, "I am glad to take this opportunity to thank you for all you have done for Physical Geography." The late Sir John Herschel acknowledged his indebtedness to the Physical Atlas for great part of his information, in writing on this branch of geography; and, undoubtedly, the volume has been, and is still, the basis of the whole English literature of this subject.

It is generally admitted that Keith Johnston did more to popularize the study of geography than any previous author, and his minor works have made his name a household word throughout Britain. His own country is specially indebted to him in various ways. In 1851, in a memoir read before the Royal Society of Edinburgh, Keith Johnston drew public attention to the Ordnance Survey of Scotland, which, up to that time, appears to have suffered almost complete neglect; and to the agitation in this matter which followed, in which Sir Roderick Murchison took a strong and active interest, Scotland is indebted for the progress which has since been made in this most important public work.

Dr. Johnston was one of the originators of the Scottish Meteorological Society, the early meetings of which were held in his house; and to his earnest working in its behalf as its Honorary Secretary, as well as to the broad spirit in which he prosecuted the science of Meteorology, that Society is indebted in no inconsiderable degree for the wide reputation it enjoys.

During the later years of his life his mind was more specially directed to the subject of educational geography; his endeavour

being, after correspondence with very many of the more eminent teachers of geography throughout the kingdom, to reconcile, if possible, into one best system, the many varied methods of geographical instruction which are at present adopted, and to prepare appliances suited to such a plan. His most ardent hope was to sow the seeds of a greater respect for geographical knowledge in Britain, out of which might grow the position due to it as an essential branch of liberal education in higher schools, such as it has long held in the universities of the Continent, notably of Germany.

Dr. Johnston's personal character was marked by a singular simplicity and candour, thorough benevolence, and unselfish generosity. Most enthusiastic in his love for and pursuit of his profession, and its absorbing studies, he was yet more readily accessible to any one seeking his advice or assistance.

CAPTAIN JAMES PALLADIO BASEVI, of the Royal (late Bengal) Engineers, Deputy-Superintendent of the Great Trigonometrical Survey of India, was born on the 23rd of February, 1832. His father was the celebrated architect, George Basevi, who designed the Fitzwilliam Museum at Cambridge, the Conservative Club in London, and various other important buildings, and who lost his life by falling from the tower of Ely Cathedral.

After passing with great credit through Rugby School and the Cheltenham College, James Basevi obtained a cadetship in the Honourable East India Company's Military Seminary at Addiscombe, where he rose to be the first cadet of his term, and thus won for himself a commission in the Corps of Engineers of the Bengal Presidency. He went to India in 1853, and was appointed an assistant in the Great Trigonometrical Survey of India, on the 18th January, 1856. From that time until the end of his life he continued to serve in the latter department, which he had been induced to select from a preference for its duties over those of any other branch of the public service in India which was open to him; and his natural abilities, great energy, and persistent self-devotion, soon established him in the position of one of the most able and reliable officers of the Department.

He took a prominent part in each of the various branches of the operations. In 1856-7, he assisted in the principal triangulation of the Valley of the Indus, and on the termination of the field season in the plains—which is contemporaneous with the commencement of the season for field operations in the higher Himalayas—he was transferred to assist in the survey of Kashmir, on which

he was employed during the eventful summer of 1857, when the mutiny of the Bengal Army took place, and his countrymen were engaged in a desperate struggle, not only for the maintenance of the British power in India, but for their very existence. From motives of policy, it was not considered desirable to suspend the operations of the Himalayan surveyors before the time when they would be naturally terminated by the close of the season for field operations. Thus, when the surveyors returned to the plains, Delhi had again fallen into the hands of the British, and the crisis of the insurrection was over.

By the end of the field season of 1859-60, Captain Basevi had carried the principal triangulation of the Indus down to the neighbourhood of Mittenkote, at the junction of the Indus and the Sutlej rivers, and was on his way back to recess quarters, when he was directed to join the expedition, which was sent under General Sir Neville Chamberlain, K.C.B., into the hills among the northern offshoots of the Soolimani Range, to punish the tribe of Mahsood Wuzeeris for repeated inroads and aggressions; he assisted in making a valuable military reconnaissance of the country, and executed a continuous and unbroken traverse of the line of march which was the basis of the survey. In the year 1860 he was transferred from the Valley of the Indus to the east coast of the peninsula, to carry on the principal triangulation, which was to connect Madras with Calcutta, and which had then reached the vicinity of Vizagapatam. In two field seasons he carried this chain of triangles 180 miles southwards, into the district of Guntoor, when he was recalled to Vizagapatam to make arrangements for, and assist in, the measurement of one of the great Indian base-lines with the well-known Colby apparatus of compensation-bars and microscopes. This base-line being completed before the termination of the field season, Captain Basevi was employed during the remainder of the season (1862-63) in making a reconnaissance —partly for geographical purposes, and partly for the requirements of the survey—of the native states of Jeypore and Bustar, which, though lying in the vicinity of the British stations of Vizagapatam and Vizianagram, and of the main lines of communication between Calcutta and Madras, had up to that time been unsurveyed, and were almost unknown, appearing as a great blank on the latest and best maps of the Madras Presidency. Covered with dense malarious forests, which swarm with tigers, the deadly reputation of this region appears to have been a bar, alike to the explorations

of the curious and scientific, and to the visits of sportsmen. Captain Basevi carried a continuous traverse from his point of departure (in the Vizagapatam district) over the Galikonda hills to Jeypore, and thence to Badrachellum, on the River Godavery, which was his terminal point. He and his assistant, and all the native followers, suffered more or less from fever, but may be considered to have escaped with comparative impunity; for it was in carrying a triangulation through these regions that Colonel Everest suffered so severely in 1819, when "he and his assistants, and the entire native establishment, were struck down by a malignant fever, many perished miserably by the roadside, and the survivors had to be carried into Hydrabad, whence the whole of the public elephants, litters and vehicles of all descriptions, had to be despatched to their succour on the receipt of the first intelligence of the calamity."* Captain Basevi succeeded in making a good preliminary map of Jeypore, which was subsequently published; and he furnished an excellent report, giving a general description of the country, and details of the route-survey, and of the astronomical determinations of latitude and longitude by which it was checked from time to time.†

In 1864 Captain Basevi was in England on leave of absence, when preparations were being made for the pendulum operations which were to be carried out in India, at the recommendation of the President and Council of the Royal Society. It was proposed that two pendulums, the property of the Royal Society, one of which had been swung by General Sabine in his celebrated operations at several stations, extending from the Equator to the Arctic Ocean, should be taken out to India, and swung at some of the stations of the great meridional arc of triangles which extends from Cape Comorin to the Himalayan Mountains, and was measured by Colonels Lambton and Everest. Up to that time pendulum observations had been mostly made at stations on islands and coasts, and not in the interior of continents: thus further observations were needed to ascertain to what extent the results might be affected by differences in the conditions of the earth's crust under continents as compared with oceans. By the combination of pendulum observations with the astronomical and geodetic measurements

* See 'Account of the Operations of the Great Trigonometrical Survey of India by Colonel Walker,' vol. i. p. xxxi.

† See 'Report of the Operations of the Great Trigonometrical Survey of India during 1862-63,' by Colonel Walker. With Appendix by Captain Basevi.

of the Indian Survey, a very favourable opportunity would be presented for acquiring information of great value towards the solution of many problems of high scientific interest. Such an undertaking was precisely one for which Captain Basevi was admirably well qualified: for, while ever ready to throw himself into any work which he might be called on to perform, his bent of mind and habits of study led him to feel a preference for the more purely scientific branches of the operations of the Trigonometrical Survey.

He commenced operations in 1865, at Dehra Doon, the head-quarters of the Trigonometrical Survey Department, which is situated in long. 78° E., in a valley at the foot of the southern slopes of the Himalayan Mountains. By the spring of 1871 the operations in India had been nearly completed; all that was wanting was for the pendulums to be swung on the high table-lands in the interior of the Himalayas, where altitudes exceeding 15,000 feet might be attained in localities suitable for the operations. The pendulums were then to be taken back to England, and swung *en route* at Aden and in Egypt, which would have afforded two very interesting comparative determinations of gravity. They were to be swung finally at the Kew Observatory, the base station of the operations, where they had been swung immediately before being taken out to India.

Thus Captain Basevi's programme was fast approaching completion, and he was eagerly looking forward to a speedy return to his native land, with the gratification of having successfully accomplished an arduous and difficult series of operations. But the most difficult portion of the work—the operations in the higher Himalayas—had still to be accomplished; and these caused him to be exposed to severe privations, in a barren and desolate region almost wholly devoid of the necessaries of life, exceedingly elevated, and, consequently, having a highly-rarified atmosphere, in which breathing is difficult and the slightest exertion very fatiguing. The weather, too, happened to be very inclement, and Captain Basevi was exposed to great extremes of cold and heat, and to frequent rains and heavy snow-storms while on the line of march. He completed a very satisfactory series of observations at Moré (lat. 33° 16′ N., long. 77° 54′ E.), at an altitude of 15,500 feet, and was commencing a final series of observations on the table-lands at the eastern extremity of the Changchenmo Valley, in lat. 34° 10′ N., long. 79° 25′ E., elevation 17,100 feet, when a bronchial disorder, from which he had recently begun to suffer, suddenly became greatly

aggravated, and caused his death, which took place on the morning of the 17th July. No Europeans were with him at the time, nor any medical man within hundreds of miles; but his native servants and attendants seem to have been attentive and well behaved, and to have done all they possibly could for him. To the last he was in full possession of his faculties, but, apparently, quite unaware of his danger; in fact, his death occurred very suddenly, just after he had risen from bed, at daybreak, and was dressing to go on with his work,—the extreme cold probably causing congestion of the lungs.

It is usual to look upon British India as one country; and it is somewhat difficult to realise the fact that, within the limits of our Indian empire, every variety of climate is presented, from that of extreme tropical heat in Central and Southern Asia, to that of extreme Arctic cold in the highly-elevated plateaux of the Himalayan ranges. To all these vicissitudes of climate Captain Basevi was exposed, in the course of his pendulum observations; and he has clearly fallen a victim to his work, with, probably, a far greater persistency of devotion than if he had died as a soldier on the battle-field: it would be difficult to find his equal in habitual forgetfulness of self and devotion to duty.

He has left a widow and two sons; who, it is to be hoped, will not be altogether forgotten by the country to whose service his life, up to the very last, was so unreservedly dedicated.

Dr. BERTHOLD SEEMANN, the well-known traveller and botanist, died at the Javali Gold-mines in Nicaragua, in which establishment he held an important appointment, on the 10th of October last, at the early age of 47 years. He was a Hanoverian by birth, having been born in the city of Hanover in 1825. After receiving an excellent education in the Lyceum of his native place, he spent some time in studying his favourite science in the Botanic Garden at Göttingen, at which University he also completed his general education, and received the diploma of Phil. Dr. Soon afterwards, having attained his 20th year, he came to England and obtained the appointment of Naturalist on board the *Herald*, in which capacity he made a voyage round the world and three cruises to the Arctic regions in search of Sir John Franklin. The history of the voyage was afterwards published by him, in 1853, under the title of 'Narrative of the Voyage of H.M.S. *Herald*, 1845–51, under the Command of Capt. Henry Kellett;' and he also wrote an account of the botanical results of the same, which was published

in 1857. In 1855 'A Popular History of Palms' issued from his pen. During these years he resided chiefly in his native city, where he founded and edited a botanical journal, the 'Bonplandia.' In 1861 was published an English translation, which he had previously prepared, of Von Kittlitz's 'Views of the Vegetation of the Coasts and Islands of the Pacific,' in which the general aspect or physiognomy of vegetation in various regions and latitudes was attempted to be displayed in a series of tableaux, pictorial and descriptive. Shortly before the date of this work, in 1860, he was appointed member of the Commission sent out by the Government to the Fiji Islands, with the object of ascertaining the advisability of accepting the cession of the group as a British colony. The results of the journey were published in 1862, in a popular form, under the title of 'Viti; an Account of a Government Mission to the Fijian Islands.' The botanical collections made during his visit were described in a beautiful serial work, the 'Flora Vitiensis,' published by private subscription between the years 1865 and 1868.

His voyage to the Fiji Islands was by no means the last of his undertakings, for since then he made several visits to Central America, on special missions connected with mines and other commercial undertakings, during which he always found means to continue his botanical studies and researches. He was a man of prodigious industry, finding time in the intervals of his travels and greater works, to edit a botanical journal; first the 'Bonplandia,' from 1853 to 1862, and afterwards the 'Journal of Botany,' from 1863 to the epoch of his last departure for his more permanent residence in Nicaragua; and he was also a frequent contributor to English and German periodical literature. He was a member of our Society since the year 1862.

JOHN MARKHAM was born at Leghorn, on April 1st, 1835. His father, Captain J. Markham, R.N., was son of William Markham, Esq., of Becca Hall, in Yorkshire, and grandson of Dr. William Markham, Archbishop of York.

In 1852 John Markham was appointed, by Lord Malmesbury, to a Student Interpretership in China. In February, 1853, he became Acting Assistant at Canton; in April, 1854, Assistant at Foo-choo; in October, 1856, Second Assistant in the Superintendency at Hong-Kong; and on June 16th, 1857, he was appointed First Assistant at Bangkok, in Siam. On December 22nd, 1858, he became Vice-Consul at Shanghai, and on January 30th, 1868, Consul at Chefu.

In 1870 he was appointed to officiate as Consul at Shanghai, during the absence of Mr. Medhurst, and he died there on the 9th of October, 1871.

"An able and energetic Consul, a courteous and kindly chief, a most popular and genial man, Mr. John Markham had earned high respect as an official, and the warm regard of all who had personal intercourse with him. Possessing strong common sense, and much energy and decision of character, Mr. Markham filled with credit the various posts to which he had been nominated, and, just before his death, he was identified with the greatest advantage that has been gained for foreign intercourse with China, since the treaty of Tientsin. It is due primarily to his energy, in contesting the restrictive measures attempted by the Shanghai Taotai, that the transit-dues clause of the treaty of Tientsin has at length been given its broad and true interpretation by the Pekin Government. Always accessible and courteous, and always ready to forward any public enterprise, whether in his official or private capacity, Mr. Markham earned for himself a popularity which will not be readily forgotten."—*North China Daily News*, Oct. 10th, 1871.

The English community in China has marked their sense of the loss they have sustained in the death of Consul Markham, by generously subscribing, for the benefit of his widow, the sum of 15,000 taels.

Mr. Markham was elected a Fellow of the Royal Geographical Society in 1870, and he read a paper on a journey he made through the province of Shantung, which was published in our 'Journal' for that year. It contains a very interesting account of the tomb of Confucius, and much valuable information respecting the products and capabilities of that important province. Mr. Markham has left behind him a large quantity of manuscript notes relating to the trade and history of China, and to the Taeping rebellion.

He was married at Hong-Kong, on February 16th, 1858, to Miss Caroline Rickett, who, with two young daughters, survives him.

GEORGE GROTE.—Although this eminent historian, one of the chief literary ornaments of our country, was not known to the world either as a traveller or geographer, his death cannot be here recorded without some notice of his career. The Society was proud to have his name enrolled as one of its Fellows, he having shown his appreciation of our labours by joining our body in the year 1858. He may be said to have been further connected with us from his position as Vice-Chancellor of the University of London, in which capacity

he always favoured our annual application for permission to hold our meetings in the Hall of the University—first, during a series of years, in the Old Burlington House, and afterwards in the magnificent building in which we are now assembled.

It is not necessary here to narrate the incidents of Mr. Grote's career, which are well known and have been more fully recorded in other publications; but it may be necessary to remind our associates that he was born in 1794, at Beckenham, in Kent, the son of a London banker, and that on completing his education at the Charterhouse, after a short trial in his father's business, he abandoned commercial pursuits for those, first, of politics, and afterwards of literature. It was in 1841 that, wearied with the want of sympathy which the Reformed Parliament showed for his philosophical Radicalism, he retired from the representation of the City of London and applied himself with concentrated energy to his 'History.' The first volume of his great work appeared in 1846, and the termination was reached in 1855. It was received with universal applause, and in Germany was even more enthusiastically welcomed than at home. So great, indeed, was its reputation, that, long before the successive volumes appeared, we find the great Niebuhr recommending a friend, to whom he had given a letter of introduction to Grote, to secure, if possible, proof sheets in advance of publication, in order that he might translate them into his own language.

Mr. Grote was the champion of the London University long before it had won that elevated place in public opinion which it now holds for the searching nature of its examinations, its direct representation in Parliament, and the large influential body of its graduates. From first to last he was the presiding genius over this liberal educational institution. On him, in its earlier years, devolved the greater part of the labour of managing its affairs. He was always ready to draw up its reports with his own hand, and to strengthen it with his countenance and advice. He was also an indefatigable worker in the public service as a Trustee of the British Museum, never sparing himself, even when his health failed, for the sake of that noble institution.

He was a member of the French Institute and of many other foreign and home Academies and Societies. He died of a lingering illness on the 18th of June, 1871, and was interred in Westminster Abbey on the 24th of the same month.

The Earl of ELLENBOROUGH.—The late Earl became a Fellow of our Society in 1845, on his return from India, after his stirring and

brilliant three years' administration as Governor-General of our Eastern Empire. He distinguished himself, as we all know, in after years, as a most effective speaker in the House of Lords, but, as far as I am aware, did not leave any memorial of his abilities as a writer. As the son of the celebrated Chief Justice of the Court of King's Bench in the reign of George III., life opened with brilliant prospects for the late Earl. He was born in 1790, and received his education at Eton and Cambridge, and obtained his degree of M.A. in 1809.

I cannot close this brief notice of Lord Ellenborough's career, without placing on record my deep personal acknowledgments to him for having, at my own special request, transferred my services after the Afghan War to the remote country of Turkish Arabia, and thus enabled me to pursue those researches into the early history and geography of Western Asia which have proved of so much public interest, and which have, in fact, led to my being in the position that I now occupy as your President.

Mr. JAMES CHAPMAN, a South African traveller, much esteemed in Cape Colony, where he had been for many years a resident, died at Du Toit's Pan, in the Diamond Fields, on the 6th of February last. For many years he was employed as ivory trader in the interior, and displayed great courage and enterprise in undertaking distant journeys; in one of which, to the Victoria Falls of the Zambesi, he was accompanied by the well-known traveller Mr. Thomas Baines. Mr. Chapman published, in London, an account of his journeys in 1868, under the title of 'Travels in the Interior of South Africa.' He was enrolled a Fellow of our Society in 1867.

Mr. JOHN POWER, C.E., the Proprietor and Editor of the 'Panamá Star and Herald,' and a gentleman of high literary attainments, died on the 13th of May last, in the fifty-first year of his age. He was born at Youghal, in Ireland, and was for many years resident in Central America, taking an active part in all that tended to develope the resources and add to our knowledge of that country. Failing health, brought on by incessant labour, compelled him to return to England, where he busied himself up to the time of his death in collecting material on his favourite subject, the History and Material Progress of Central America and the adjoining countries. He was the author of a 'Description of the Province of Sancto Domingo del Darien in 1754, translated from the original in the National Archives of Bogotá;' published in 1868, and of other

smaller works, and was a Fellow of our Society since the year 1854.

Mr. WALTER COPE was known for many years, in his position as our diplomatic representative in the Republic of Ecuador, as the generous and enlightened supporter of all scientific travellers in that most interesting part of South America. His residence in that country extended over the years from 1827, when he was appointed Consul at Guayaquil, to 1861, when he retired, having served during the last seven years as Chargé d'Affaires. He died at his residence near London on the 15th of December last, having reached the advanced age of upwards of 90 years.

The notices of Commander A. G. GLASCOTT, R.N., who, by his topographical work, as member of the Turko-Persian Frontier Survey, rendered eminent service to geography, and Captain DAVID J. NASMYTH, of the great Trigonometrical Survey of India, not having been completed in time, will appear in the next year's Address.

Other Fellows, whose loss during the past year we have to deplore, are the following, many of whom distinguished themselves in various other walks of life, although not known to the world as geographers or travellers:—Sir Thomas Dyke Acland, Sir Peregrine P. F. P. Acland, Bart., Mr. J. H. Buchan, Mr. R. B. Byass, Mr. C. Buxton, M.P., Mr. Richard Bentley (the well-known publisher), Mr. W. Balfour, Mr. D. R. Blaine, Mr. E. L. Betts, Rev. C. J. Fynes Clinton, the Earl of Dunraven, Mr. C. Faulkner, Rev. C. Forster, Mr. D. A. Freeman, Mr. R. J. Garden, Mr. R. Henderson, Mr. R. Honywood, Mr. A. Laybourne, Mr. J. Levick, Captain G. F. Lamert, Mr. J. Monteith, Mr. Thomas Ogilvy, Sir Thomas Phillips, Bart., Admiral W. Ramsay, Mr. J. Somes, Sir J. York Scarlett, Mr. W. J. Spencer-Bell, Mr. P. Sharp, Mr. F. F. Searle, Mr. A. W. Tooke, and Mr. W. Young.

ADMIRALTY SURVEYS.*

The surveying operations which have been carried out at home and abroad by H.M. ships during the past year, may be briefly described as follows:—

Upon the East Coast of England, the *Porcupine*, under Staff-Capt. E. K. Calver, with three assistants, has been engaged during the

* By the Hydrographer, Rear-Admiral G. H. Richards, C.B., F.R.S.

greater part of the season in re-surveying the Lynn Wash, the most considerable indentation upon that coast, and comprising within the area re-examined upwards of 450 square miles.

Since the former survey by Captain Hewett in 1828 many changes have taken place in the coast-line of this estuary, principally from its being the depository of the waste which is slowly, but continually, in operation on the shores to the north as far as Scarborough Head; numerous embankments have been formed, especially towards the head of the inlet, to enclose and retain the new lands thus formed, and in some parts the coast-line has assumed entirely new features, principally in Boston Deeps and towards Lynn,—the latter due to an artificial diversion of the former sea-channel between the Deeps and the town. The outer portions of the navigation have but little changed since the survey of 1828. This new chart, being ready for the engraver, will shortly be published.

During a few weeks in the middle of the season the *Porcupine* was employed in making a minute examination of the coast between the Thames and the Tay, and in examining the nautical works in progress at the principal seaports.

On the West Coast of England, Staff-Commander J. Richards, with his two assistants, has been chiefly employed in making a new survey of Morecambe Bay, the sands of which had undergone great changes since the last Admiralty Survey by Capt. Denham in 1845. The Grange Channels near the middle of the Bay, which at that date were two distinct passages, are now merged in one, of proportionally greater and deeper dimensions, to the benefit of navigation generally, and especially so to the neighbouring town of Morecambe. The alterations in the banks near Fleetwood and Peel harbours, although important, are not so considerable; nevertheless, the new chart, when published, will be welcomed by those interested in the prosperity of the rapidly rising manufacturing town of Barrow-in-Furness, as well as of Fleetwood, Morecambe, and Lancaster.

During a part of the season the *Lightning* was employed in making a preliminary examination of the banks off the south-east coast of Ireland, which were reported to have undergone changes. The Arklow and Blackwater banks were found to have grown out in elbow-like forms for a distance of about two cables' length to the south-east, and to have become shoaler at those parts. The swatchways, or channels across the banks, had also nearly filled up.

Holdens Bed had shifted nearly half a mile to the eastward of its former position on the chart, thus improving the channel into Wexford South Bay.

It is hoped that a new survey of these localities will be made during the present year.

The Admiralty Survey of Portsmouth continues to be carried on with a steam-launch and a small party under Staff-Commander D. Hall and one assistant; during the past season a survey of Southampton Water has been commenced on a large scale, which has long been required, and is to include the Bramble Bank. This Bank, since the survey of 1845, has extended to the northward, narrowing the channel to Southampton, and necessitating the placing of another buoy for the safety of its navigation.

Staff-Commander Hall has also been charged with the general direction and supervision of the dredging operations for the deepening of the channel into Portsmouth Harbour, with the view to the maintenance of a straight passage with an uniform depth of 20 feet of water at ordinary low spring-tides.

The Surveys in the Mediterranean and Red Seas, which, since the opening of the Suez Canal, have been combined, are under the direction of Captain G. S. Nares. in H.M.S. *Shearwater*.

A complete re-survey of the Gulf of Suez was commenced in the winter of 1870, and, by dint of great exertion on the part of Capt. Nares and his officers, it has just been completed, as far south on the African shore of the Red Sea as Cosire and the Brothers Islands. A re-survey of Port Said and its approach has been made each year since the opening of the Canal, in order to ascertain whether any change in the depth is taking place likely to affect navigation, and the *Shearwater* is at present engaged on this work. No delay will take place in the publication of the new survey of the Gulf of Suez.

In connection with the *Shearwater's* labours, it may be mentioned that a short time was spent during the autumn of 1871 in pursuing the investigations of the currents in the Strait of Gibraltar, which were commenced in the *Porcupine* in 1870, under the auspices of Dr. Carpenter, F.R.S., and Captain Calver. Upon this latter occasion Dr. Carpenter again volunteered his services, and accompanied Captain Nares in the *Shearwater* to the Mediterranean.

The observations which were made by these gentlemen, and the results obtained, were interesting in a scientific point of view, and will prove practically useful to navigation. The public will, no

doubt, be in possession of them from the able pen of Dr. Carpenter himself at an early date; in the mean time a paper from Captain Nares has appeared in the 'Proceedings of the Royal Society,' and has been published in greater detail in a separate pamphlet by the Admiralty. It is sufficient here to state that the well-known Gibraltar current running into the Mediterranean was proved to be superficial, and that, below, the movement of the water was found to be tidal,—the eastern-going surface-stream being modified in its strength, and even turned to the westward during east winds or calms. We shall have occasion to return to the question of Ocean Circulation before concluding this brief report.

The West India Survey is carried on in a small hired vessel by Staff-Commander George Stanley and two assistants.

For the twelve months between July, 1870 and 1871, they were employed on the coast of British Guiana, during which time 4000 linear miles of soundings and 90 miles of the low monotonous coast-line of the colony were completed, under considerable difficulties owing to the nature of the climate, light variable winds and strong currents, and the fact of the vessel being without steam-power. The approach to Demerara, however, has, through the labour of the surveyors, been made clear to the navigator, the depth and nature of the bottom being distinctly charted for a considerable distance to seaward. The results of this survey are in course of preparation for publication.

The West India Survey is, for the present, removed to the Island of Dominica.

The Cape of Good Hope Survey is carried on chiefly by shore-parties, assisted occasionally by boats, and by one of the cruisers on the station when one can be spared. Navigating-Lieutenant Archdeacon is in charge, and has one assistant. Notwithstanding serious difficulties of various kinds which they have had to encounter, good progress has been made with the triangulation and survey of the coast-line; no less than 250 miles having been completed, or from the Bashee River to Point Morley, the northern boundary of the British possessions on the East Coast of South Africa. During the first half of this journey the party had to pass through the country of unfriendly Kaffir tribes, and, owing to the not over-successful negotiations of the Cape Town Government, who had undertaken to make the necessary arrangements for their safe conduct, they found themselves, on more than one occasion, in considerable peril; and, in the neighbourhood of St. John's River, were

compulsorily detained by the Chief of the Ponda tribe for a period of seven weeks, and were only permitted to proceed after the energetic interference of the Natal authorities, to whom Mr. Archdeacon had succeeded in communicating his uncomfortable position.

During the last three years of the progress of this survey, the party have undergone extreme privations, and have worked with unremitting energy; and it is a source of satisfaction that nothing now remains but to complete the soundings, which will be done by Mr. Archdeacon's naval assistant, so soon as the Commodore on the station can afford him the necessary help of a ship for the purpose.

Mr. Archdeacon himself will shortly proceed to a new field of labour on the coast of Western Australia, whose energetic Governor, Mr. Weld, has promised the funds necessary to commence a work of so much importance to that colony, and which will be supplemented by an equal sum from the Imperial Government.

Newfoundland Survey.—Staff-Commander J. H. Kerr, with his two assistants, has, during the past year, surveyed 300 miles of coast-line, with 280 square miles of soundings, in Bona Vista Bay. The comparative absence of fog, and an unusually fine season, have enabled this material progress to be made upon a coast which generally presents more than ordinary difficulties to the surveyor. The eastern shores of Newfoundland are now completed as far as Poulinquet Island in Notre Dame Bay, or to 49¼° of N. lat. and 54¼° of W. long., an examination which was greatly needed, owing to the numerous shoals and reefs with which this coast abounds. The survey will now be prosecuted along the south coasts of the island. Most of the existing charts of this part of Newfoundland were executed by Captain Cook a century ago, and although, of course, generally accurate, are necessarily entirely deficient in those details which are essential to navigation in the present day.

South Australia.—In January, 1871, the surveying party on this coast, under Staff-Commander Howard, proceeded in their hired schooner, the *Beatrice*, to the south-eastern part of the colony, where they were engaged in sounding the coast surveyed on a previous occasion, until the latter part of June, when, having completed their work to the distance of 8 miles off shore, which is as far as it can be seen from a small vessel's deck, they returned to Adelaide. The whole of the eastern coast of the colony having been completed, their attention was devoted to the western shore of Spencer's Gulf, about 150 miles of which remained unsurveyed. By January, 1872, nearly 60 miles was accomplished, including the lagoon-like

opening known as Franklin Harbour, in the upper part of the Gulf; the greater part of the soundings have also been obtained, and it is hoped that the survey of Spencer's Gulf will be completed by the middle of the present year.

Victoria, Australia.—The survey of this coast from Cape Otway to Cape Howe, the boundary between Victoria and New South Wales, has now been completed, and the party under Navigating-Lieutenant H. I. Stanley, have latterly been employed on the exposed coast westward of the former cape, about 70 miles of which has been surveyed. The total amount which has been completed during the past year is about 120 miles, almost all of which had to be carried on by parties on land. The difficulties at times were very great, owing to the precipitous nature of the shores, and the dense character of the brushwood; and, on one occasion, a party of five men were for several days cutting a footpath, less than a mile in length, through a country never before trodden by man. In addition to the coast-survey, 1600 square miles of soundings have been taken in a small river-steamer, where it was necessary closely to watch every change of weather, in order to ensure reaching shelter.

The Survey of Victoria is now drawing near its close; but King Island, at the western approach to Bass Strait, has not yet been closely examined. It belongs to the neighbouring colony of Tasmania; but, in regard to the safety of navigation, it is of equal importance to the Australian colonies, and it would be a cause for regret if the survey were withdrawn before the approach to Bass Strait was accurately surveyed and sounded.

New South Wales.—As noticed in former Reports, the sea-board of this colony has been thoroughly surveyed, but the Admiralty Surveyor, Navigating-Lieutenant Gowland, has, by permission of the Admiralty, been retained in New South Wales entirely at the expense of the colony, for the examination of its interior waters.

The Richmond and Hunter rivers have been carefully sounded, on large scales, as far as the head of ocean navigation, which, in the former, is available for vessels of 10 feet draught as high as 60 miles, and the latter for as high as 40 miles, or to the town of Morpeth. These rivers are rapidly becoming settled, and their banks peopled.

Queensland.—The principal work accomplished during the past season by Staff-Commander Bedwell, on the coast of Queensland, has been the survey of Port Curtis on a large scale, which has occupied a considerable time, owing to the numerous inlets which

empty themselves into the port, and which it has been necessary to trace and examine. Many of the shoals appear to have changed considerably since the survey of 1847. The outer coasts of Facing and Curtis Islands, which form the port on its eastern and northern sides, have been surveyed from East Point to Cape Capricorn, and the approach has been thoroughly sounded from a distance of 10 to 12 miles off shore.

North China and Japan.—This survey, under Commander H. C. St. John, is carried on in H.M.S. *Sylvia;* and during the past year it has been confined entirely to Japan. Yezo, the northern island of the group, hitherto very imperfectly known, and erroneously laid down on our charts, has been circumnavigated, the positions of all its salient points determined, and the harbours surveyed on large scales—most of the detail of the general coast-line having been procured from the Japanese, who possess good maps of the whole country. The *Sylvia* has also completed a good deal of useful work in the Inland Sea, which will enable a new chart of that now much-frequented navigation to be published, and has surveyed Nambu Harbour, in Yamade Bay, on the east coast of Nipon. The ship has been most actively employed during the whole season.

Eastern Archipelago.—H.M.S. *Nassau*, Commander Chimmo, has been employed in the examination of the western part of the Sulu Sea, between the *Rifleman's* Survey of Balalac Strait, and the Islands of Cagayan Sulu; she has carried some soundings, and fixed the positions of some dangers across the sea, between Balalac and Ilo Ilo, in the Island of Panay, one of the Philippines, and has commenced the survey of the channels among the Sulu Archipelago, between the Sulu and Celebes Seas.

River Plate.—During July and August last, Lieutenant Dawson, with an assistant, and aided by the officers of the Brazil Squadron, made a careful examination of that portion of the River Plate between Monte Video and Buenos Ayres, from which the chart will be corrected; and so long as the light-vessels are kept in position, vessels after rounding the tail of the Ortiz Bank, may steer for Buenos Ayres without fear of the numerous shoal-spots which were shown on the old chart.

Expedition for Oceanic Investigation.—Returning to the subject of physical geography, and the exploration of the bed of the sea, it will be satisfactory to those who are interested in such investigations, to know that it is the intention of the Admiralty to send

out, towards the close of the present year, an expedition, on a considerable scale, for the exploration of the three great ocean-basins; to investigate their physical and biological conditions, to ascertain their depths as far as may be, and to trace their currents and temperatures, superficial and serial; in the interests of geography and hydrography, to visit and explore islands in the Pacific and Southern Oceans, of which little more is known at present than that some of them exist, and that may have been multiplied over and over, through the incorrect observations of ancient discoverers and navigators.

The results of the expedition generally, it is hoped, will be such as to tend to the advancement of scientific knowledge, and to further objects of practical utility, such as can only be achieved by fitting out a vessel specially and exclusively devoted to such a service, accompanied by men competent in all branches of physical science, which are to be represented, and liberally provided by the Government with all materials and appliances necessary to ensure success.

In concluding this Report, it is due to two of the most able and experienced of the Admiralty Surveyors, whose names for long prominently appeared in these pages, to notice that they have lately retired from active service afloat, viz., Captains E. K. Calver and John Richards: the former for many years in command of the Survey of the Eastern Coast of the United Kingdom, where his name will be long remembered in connection, not only with the hydrographical, but with most of the great engineering and nautical works of the time; the latter no less distinguished for his labours while conducting the surveying operations in the China Seas, than for the excellent Survey of the Channel Islands, lately completed by him. Their useful labours will be remembered and appreciated by seamen, and will endure as fitter monuments to their skill and industry than any tribute which could be paid to them here.

Summary.—In addition to the usual tide-tables, light lists, hydrographical notices, &c., which have been published during the past year, there have been new editions of Sailing Directions for the West Coast of Scotland, the British Channel, the Black Sea, and the Eastern Coast of Southern and Central America, and Gulf of Mexico.

Sixty-three new charts have been engraved and published, while above 1400 have been added to and corrected; and during

the last year 140,000 charts have been printed for the Navy and the public.

OCEANIC CURRENTS. — The Temperature-soundings which have been recently taken in the course of the explorations of the Deep Sea, carried on by Dr. Carpenter and his colleagues, have led him to put forth a doctrine in regard to a General Oceanic Circulation, sustained by difference of temperature alone, which has been accepted as valid by many eminent Physicists, and, if substantiated by more extended inquiry, must have an important bearing on many questions of the highest interest in Physical Geography and Geology.

Dr. Carpenter bases this doctrine upon the fact, long since experimentally determined by Despretz, though ignored by many writers on the Physics of the Sea, that sea-water does *not* expand, as fresh water does, from 39° downwards, but continues to contract until it freezes, attaining its maximum of density at about 25°. And he argues that, as a column of Polar water thus weighs much more than a column of Equatorial water of the same height, its excess of lateral pressure must cause an *outflow* of the *lower* stratum of glacial water from each Polar basin, along the deepest channels of communication with other Oceanic basins, lowering the temperature of their sea-bed as far as such outflow extends. And since the reduction of level caused by this outflow must produce an *indraught* of *surface*-water to replace it, which will in its turn have its own density augmented by Polar cold, the excess of downward pressure in the Polar column will be constantly renewed, so far as to impart a continual *downward* movement to its entire mass; and this will maintain a *constant* outflow of glacial water along the sea-bed, from each Pole towards the Equator. In its course, however, this stratum will be subject to the heating influence of the warmer crust of the earth beneath, and of the warmer water above; and thus in the Temperate and Tropical areas there will be a continual *upward* movement of Ocean-water, replacing that which has been drawn away from their upper stratum by the Polar indraught. Thus a constant *vertical circulation* will be maintained, analogous to that which takes place in the water-pipes of a heating apparatus; except that the movement which is sustained in the latter by the application of *bottom-heat*, is sustained in the former by *surface-cold*—the disturbance of equilibrium being alike in both cases.

The evidence of such a circulation is found by Dr. Carpenter, *first*, in the general prevalence of a temperature but little above 32° over the deep ocean-bottoms, even under the Equator, as indicated by recent Temperature-soundings taken with thermometers protected against the effects of pressure, which vitiated all the older observations; and *second*, in that "set" of an upper stratum of comparatively warm water towards the Arctic area, which all recent observations concur in indicating. That the deep stratum of glacial water must have been derived from the Polar areas, he argues from the fact that the water of the Mediterranean—which is cut off by the ridge at the entrance of the Strait of Gibraltar from communication with the deeper stratum of the Atlantic—has a temperature of from 54° to 56° at depths between 1500 and 1900 fathoms, at which depths the Atlantic under the same parallels has a temperature *nearly twenty degrees lower*. And that the warm upper stratum, which carries a summer temperature of 50° to the North Cape, is neither (as supposed by some) an extension of the Gulf-stream proper, or Florida current, nor (as maintained by others) a mere surface-drift, he regards as fully proved by the Temperature-soundings taken in the "Porcupine" Expedition south-west of the Faroe Islands, which show that its excess of warmth extends to at least 500 fathoms. From a comparison of the temperatures there obtained from the surface downwards, with those obtained at corresponding depths in lower latitudes, he argues that *the whole upper stratum of North Atlantic water* has a movement towards the Pole, which, combined with its excess of momentum derived from the earth's rotation, will give it a north-east direction; this movement being exactly what the doctrine of a Thermal circulation would predicate, as the necessary complement of the "creeping flow" of the deep stratum of glacial water in the opposite direction.

This *vertical* circulation is quite independent of the *horizontal* circulation sustained by the action of Winds; and does not, like the latter, produce sensible currents. But, if Dr. Carpenter's reasoning is correct, it performs the principal part in the amelioration of the climate of North-Western Europe, by transporting thither a vast body of water, of which the temperature is but little below that of the Mid-Atlantic; whilst it brings from the Polar into the Equatorial area a vast body of glacial water, which helps to mitigate the intense heat of the latter.

The complete elucidation of this question will require an extensive collection of accurate Temperature-soundings, taken at various

depths and in various parts of the Oceanic area. Such a collection will doubtless be made in the Circumnavigation Expedition for Deep-Sea Exploration, which is now being fitted out (at Dr. Carpenter's instance) by Her Majesty's Government, and which is mentioned in the Report of Admiralty Surveys on a previous page. But, as the work of this Expedition will probably lie for the most part in the Southern Oceanic basins, the enquiry will be incomplete unless the determination of the precise Thermal relation of the Arctic Sea to the North Atlantic is effected by a North Polar Expedition.

RECENT PUBLICATIONS.—*Petermann's 'Geographische Mittheilungen.'*—Among the important original papers which have appeared in this most valuable Geographical Journal, since the date of our last anniversary, those relating to the German North Polar Expedition, in the organization of which the able editor has himself taken such an active part, are the most numerous and complete. We shall have occasion to notice the interesting results of some of these voyages in a subsequent portion of this Address.

The papers relating to European geography include, an authoritative description of the limits, area, and minor divisions of the new German province of Elsass-Lothringen, by Dr. Hermann Wagner; and an important addition to the topography of Central Turkey, in the facts collected and surveys made by Dr. Ferdinand von Hochstetter, whilst travelling in the little-known region which surrounds Mount Vitôs.

One of the most valuable papers on Asia is that on Eastern Turkistan and its surrounding mountains, compiled from all available information, derived from the journeys of Hayward, Shaw, Forsyth, and the Russian explorers, and giving an admirable summary of the rise of this independent kingdom, its relations with the surrounding powers, its trade, cities, and population, whilst the accompanying hypsometric map is calculated to afford a true conception of the vertical configuration of this part of Asia. The paper describing Von Richthofen's more recent journeys across China, inland from Canton to Pekin, is also of great importance, bringing into notice the vast undeveloped resources of the ancient empire.

Among the papers on African geography are the interesting letters from the now well-known botanist and traveller Dr. Schweinfurth, forming a continuation of the narrative to which allusion was made by my predecessor in last year's Address.

These letters trace the journeyings of this eminent traveller in the region of the Upper Nile in 1869, 1870, and 1871, rich in geographical results, until his happy return in safety to Europe, towards the close of last year. Dr. Nachtigal's journey to Kuka on Lake Chad, bearing presents from the King of Prussia to the Sultan of Bornu, in recognition of services rendered by that potentate to German travellers, and his ethnographic researches in Wadai, is also narrated in repeated communications from the traveller, who is still believed to be in the Soudan. The progress of exploration and the extent of our knowledge of that region of West Africa through which the lower course of the great Ogowai River flows, is the subject of a memoir in which the work done by the explorers Genoyer, Fleuriot de Langle, and Aymes, of the French Marine, Du Chaillu, and Walker, is thoroughly discussed, and cartographically represented.

A first accurate notion of the vertical configuration of South-Eastern Australia is given in a map of Victoria, contoured from the hypsometrical measurements made by Dr. Neumayer, in connection with the magnetic survey of the colony.

Most important among the hydrographic papers is one by the meteorologist Mühry, on the system of ocean-currents about the extremity of South America, in which he proves a remarkable extension of the warm Brazilian coast-current, corresponding to that of the Gulf-stream in the North Atlantic, south-westward beyond Cape Horn, between the Antarctic drifts of the Pacific and South Atlantic, and shows that the well-known Cape Horn current is not, as has generally been believed, a branch of the deep Antarctic current of the Pacific, but that it is truly a surface-drift of the prevailing westerly winds. The warm extension of the Brazil current is believed by Mühry to pass beneath it, and thus to account for the remarkable southward bend in the limit of drift-ice beyond Cape Horn; the icebergs sinking deeper than the wind-drift round the Cape, are held back from it by the warm south-westerly current.

'*Our Ocean Highways.*'—Under this title has appeared for some time past a monthly Journal, as 'Monthly Supplement to the Annual Volume of the Geographical Record and Travellers' Register.' It contains in each number a popularized summary of Geographical facts, such as the progress of expeditions, remarkable travels, and so forth, and seems well calculated to assist in the spread of information of this character in this country and abroad. I am informed that in future, and under improved editorship, this publication will

add original articles on Geographical subjects and reviews of all important Geographical works and books of travels.

Switzerland.—Our esteemed Honorary Corresponding Member, M. J. M. Ziegler, of Winterthur, has sent us his usual elaborate and complete *résumé* of the progress made in Switzerland during the year, in geography and the allied sciences. He divides his report into geodetic operations, topography, physical geography, geology, and statistics. Although the scientific division of labour, as now so beneficially established in our own and other countries, does not permit us to give so wide an extension as this to the studies of our Society, it is unquestionable that an acquaintance with the chief results in all allied sciences is necessary to the geographer. Under the head of geodesy, M. Ziegler describes the arrangements made to arrive at the exact determination of the longitudes of Zurich and other places, and also the year's progress in the *nivellement de précision*, which has been continued for many years past, and has for its object the settlement of the vertical configuration of Switzerland. These and similar operations are carried out by the Federal Geodetical Board. In topography he mentions the publication of four sheets of the survey of the neighbourhood of St. Gothard, and the continuation of the reduced general maps of General Dufour. With a view to effective administration of forests, many Swiss municipalities are now having surveys and maps executed of their respective domains, on the large scales of 1 : 500 and 1 : 5000. With regard to recent researches into the physical geography of Switzerland, M. Ziegler records with much detail the observations and experiments of Messrs. Ch. Dufour and F. A. Forel on the condensation of aqueous vapour in contact with glaciers and on evaporation. One of the chief results of the careful series of observations carried out by these gentlemen appears to be the demonstration of the great drying power of ice,—the difference of humidity of the air over the Rhone glacier and that over clear ground in the neighbourhood being 32 per cent.

The statistical inquiries of the Swiss extend into such subjects as the number of public libraries in the Confederation (2090), and the proportion both of libraries and their contained volumes to the three sections of the population respectively,—German, French, and Italian. The amount of public money annually spent on public instruction is nearly 200,000*l.*, of which 66,000*l.* are granted for purely scientific education. With regard to geology, which, in its

investigation of the surface phenomena of our globe connects itself so closely with geography, our correspondent calls attention to an interesting little book by Heim, entitled 'Blick auf die Geschichte der Alpen,' which, with the exceedingly instructive geological section which accompanies it, presents in a clear light the effect of the denuding agents—water and ice—in determining the present configuration of this rugged land. The section shows how seldom the synclinal (valley) and anticlinal (ridge) positions of stratification of rocks correspond with the present valleys and hills; thus demonstrating, as Ramsay and Geikie have done in our own island, how erroneous is the view that the inequalities we now observe on the earth are the sole result of the subterranean forces.

Another of our Corresponding Members for Switzerland, Professor Paul Chaix, of Geneva, to whom the Society has been indebted on many previous occasions for valuable information, reports, this year, that an engineering undertaking of great interest to the Physical Geographer is about to be carried out in the more level portion of the country, having in view a considerable alteration of the hydrography of the region. It is the drainage, by means of deepening some water-courses and diverting others, of parts of Berne, Freyburg, Neufchâtel, and Vaud, which now, in consequence of their not being elevated above the general level of the lakes, are, during rainy seasons, liable to be flooded and converted into tracts of morass, unfit for agriculture. The liability to inundation has been yearly increasing, owing to the accumulation of silt, brought by the Aar from Berne and Aarberg, at the point of discharge of the lake-waters. A plan proposed by Colonel La Nicca, a Swiss engineer, has been adopted, by which an underground channel will be constructed from Aarberg to Hageneck, as well as surface-canals, and thus a large tract of country will be added to the wealth-producing soil of Switzerland.

Italy.—The Italian Geographical Society, of which prominent mention has been made in the Presidential Addresses of previous years, continues to prosper, and now occupies a high position amongst the scientific bodies of Europe. This result is no doubt due, to a great extent, to the enterprise and enthusiasm of its President and chief working member, the Chevalier Cristoforo Negri, who may fittingly be styled the Murchison of Italian Geographers. Under his auspices the Society has reached the surprising total of upwards of 1300 members, 70 of whom are Life Compounders. In his

addresses and communications to the Italian newspapers, chiefly 'La Nazione' of Florence, Chevalier Negri succeeds in keeping the Society and the Italian public *au courant* of all the leading geographical events of the day; and at the meetings of the Society memoirs of considerable value by Italian travellers and authors are read and discussed, which afterwards form the substance of the 'Bolletino della Società Geografica.' The last part of this work which has reached us, contains two articles well worthy of the attention of English Geographers, namely, one by Signor Amari on Edrisi and his book, and the other an account of a journey in Russian Turkistan, by Signor Adamoli, a traveller who succeeded in reaching Kokand, and might have told his story at greater length with advantage.

UNITED STATES.—The American Geographical Society, having its centre at New York, mustered, according to the statement made at the anniversary meeting in January last, 554 members. Like our own, this Society has a Geographical library and collection of maps, holds its evening meetings for the discussion of papers, and publishes its Proceedings. The great extent of unexplored territory within the States themselves, and the frequency of Government scientific expeditions, commissioned either by Congress or the separate States to survey portions of the country, seem at present to constitute the chief topics which engage the attention of the Society. These, at least, are the principal subjects on which Professor Gillman discoursed in the last annual Address. From this we learn that, besides California, prominently alluded to by Sir Roderick Murchison in the last Address, the States of New Hampshire, New Jersey, Ohio, Indiana, and Illinois, have lately been carrying on surveys, and publishing the results in volumes of Reports of great value to the Physical Geographer. As Professor Gillman observes, Geological surveys are the common form in these days in which local interest in natural science in the States manifests itself—the rational desire for a thorough knowledge of the mineral resources and the nature of the soils of their respective States, stimulating the local Governments to organize complete and effective surveys. The geological exploration, however, has always to be preceded or accompanied by a topographical survey, and almost every expedition has attached to it a zoologist and botanist, who aid in completing the Natural History of the State. From the combined labours of the different members comprehensive Reports are published, sometimes, as in the Cali-

fornia Survey, in a series of handsome and richly-illustrated quarto volumes, which form a perfect mine of scientific information.

One of the most recent of these local surveys has been that of Dr. F. V. Hayden, in the Hot Spring and Geyser district of the Upper Yellowstone River—a copy of whose Report, accompanied by excellent maps on various scales, has been forwarded to our Society. The remarkable region explored by Dr. Hayden, in his capacity as United States Geologist, lies between the parallels of 44° and 45° N. lat. and the meridians of 110° and 111° w. in the Rocky Mountains, and constitutes an elevated basin-shaped valley through which the Yellowstone River flows in its course towards the Upper Missouri. The river here, near its sources, forms a picturesque lake, 22 miles in length by 10 or 15 in breadth, and lying 7427 feet above the sea-level. Flowing from the northern end of the lake, the Yellowstone cuts its way through the lofty mountain-ridge which on that side hems in the valley, forming a series of those profound and narrow chasms, called cañons, which are so characteristic a feature in the physical geography of the whole region, mountain-peaks rising on all sides to 10,000 feet and upwards, above the sea-level. The chief peculiarity of this elevated basin, besides its beautiful scenery, resides in the hundreds of hot springs of endless variety of temperature, mineral composition, and mechanical force, which rise on all the slopes. The detailed description of these springs and geysers belongs to the province of the geologist rather than to that of the geographer, and I must refer those who wish for further information to Dr. Hayden's Report.* The account, however, which this painstaking *savant* has given of the topography and physical geography of the district must be acknowledged as a valuable addition to geographical science. I must not omit to mention that the whole region, including the lake-basin of the Yellowstone and the neighbouring basin of the "Fire-hole River," altogether comprising an area about 60 miles in length by 50 in breadth, has been recently appropriated by Act of Congress as a National Park, and is therefore reserved in perpetuity for public use and enjoyment.

Although enjoying the advantage of so fruitful a field for scientific exploration in their own territory, Americans are by no means neglecting geographical enterprises in more distant regions. The Arctic Expedition of Hall, now engaged in an endeavour to penetrate the

* Published also in the 'American Journal of Science and Arts,' vol. iii., February 1872.

Polar Basin *viâ* Smith Sound, and supported by State funds, was noticed by my predecessor in the last Annual Address. Another important undertaking is that of Professor Agassiz, who, as is well known, is at present engaged in deep-sea investigations in the South Atlantic and Pacific Oceans. To aid this truly scientific enterprise, the American Government placed at Professor Agassiz' service a sloop of war, and the expenses are, to a great extent, met by private subscription in the States. An efficient staff of men of science accompanies the Professor, including Count Pourtales, who has charge of the dredging operations and is well known for his previous work in the North Atlantic, Dr. White as chemist, Professor Hill as physicist, and Dr. Steindachner and Mr. James Blake as naturalists. Madame Agassiz, whose talent as a chronicler of her husband's doings is well known to the world, also accompanies the expedition. The expedition was at Monte Video in February last, and sailed thence for Patagonia and the Falkland Islands.

ASIA.—Geographical research in Asia does not lead to the same large and brilliant results as in Africa and Australia. There are, in the former continent, no great discoveries to reward exploration; no important physical features to be determined; no rivers, lakes, or mountains to be introduced for the first time into the map. All that is left for the most successful inquirer is to verify a few doubtful points of Geography, or to fill in topographical details of more or less extent and consequence. Yet is the East so rich in associations of the past, so mixed up with the material interests of the present, that the mere gleanings, as it were, of Asiatic travel, command often more attention than the full harvest of discovery in other quarters.

Palestine and Syria.—Among the most attractive contributions that have been thus made to our geographical knowledge of Western Asia must be noticed, in the first place, the recent operations of the Palestine Exploration Fund. This Society, which was instituted in 1865 for the general investigation of the Archæology and Topography of the Holy Land, confined its attention, for some years, almost exclusively to the excavation of Jerusalem, and the examination of the antiquities in the neighbourhood—and whilst thus engaged, its operations hardly came under the observation of Geographers; but more recently, a series of Maps and Surveys have been executed under its auspices, by officers of the Royal Engineers and by other accomplished travellers, which cannot fail to attract

our notice and admiration, and which indeed merit our warmest acknowledgments.

Captain Wilson, R.E., and Lieut. Anderson commenced their labours for the Palestine Exploration Fund in 1865; they connected Banias with Jerusalem by a series of observations carried from north to south, and made a reconnaissance survey of 1200 square miles of country, fixing the principal points by astronomical observations; they also examined, with great care, the country around the Sea of Galilee, and were thus enabled to make some very notable discoveries and to write some able papers on the Comparative Geography of the district. Captain Warren, who continued the work after Captain Wilson's departure, devoted his attention, at one period, to the country east of the Jordan, and at another to the Plain of Philistia; his survey of the latter region having embraced an area of 800 square miles, and containing 200 positions determined by astronomical observation. Another remarkable traveller, Mr. E. H. Palmer—familiarly named "the Pundit"—one of the best Arabic scholars of the day, and as such peculiarly qualified to deal with the Bedouins, and to explain the geographical nomenclature of the country, has also been engaged under the Palestine Exploration Fund, having, in company with Mr. Tyrwhitt Drake, explored the desert of the *Tih*, between Sinai and Hebron, which was the famous "Wilderness" of the wandering Israelites. During the winter of 1868-69, Captain Wilson, in conjunction with Captain Palmer, Mr. Holland, and Mr. Palmer, conducted the Ordnance Survey of Sinai. The results of this survey have recently been published in five volumes, which—in addition to Papers on the Geography, Geology, Archæology, &c., of the Peninsula; and Photographs—contain special Maps of Jebels Músá and Serbál, and a general Map of the western half of the Peninsula.

In the autumn of last year, the Committee of the Palestine Exploration Fund determined to institute a more general survey, and accordingly despatched Captain Stewart, of the Royal Engineers, with two Non-commissioned Officers of the Royal Engineers, under instructions to measure a base-line in the Plain south-east of Lydda and Ramleh, connect it with Captain Wilson's Survey of Jerusalem, and then to extend the triangulation over the whole country west of the Jordan. Captain Stewart unfortunately fell sick whilst engaged in measuring the base-line and selecting proper trigonometrical stations, and was compelled to return to England; Mr. Tyrwhitt Drake, who was associated with Captain Stewart, has,

pending the arrival of another Officer of Engineers, been in charge of the party, and the Non-commissioned Officers have meanwhile continued the work. Jerusalem has been connected with the base-line by triangulation; and, according to the latest accounts, upwards of 250 square miles of country have been triangulated. It was calculated that four years from the date of Captain Stewart's arrival in Palestine would be sufficient to complete the survey west of Jordan, the expenses being at the rate of about 3000*l.* per annum. If the public will only continue to support the enterprise as effectively as heretofore, we may hope soon to have a Survey of Western Palestine, approximating in accuracy and minuteness of detail to the Ordnance Survey of Great Britain.

It need hardly be said that, as the Palestine Surveys have for the most part been conducted by officers of the Royal Engineers, they are thoroughly reliable as far as they extend, and that the maps which accompany them constitute most valuable additions to our geographical knowledge of Asia. The original maps belonging to the survey, which are deposited in the Office of the Palestine Exploration Fund, but which have never yet been published, are the following:—1. Captain Wilson's and Lieut. Anderson's Maps of the Sources of the Jordan, the Sea of Tiberias, Northern Galilee, and the neighbourhood of Nablus; 2. Captain Warren's Maps of the Plain of Philistia and the district east of Jordan.* To these must be added the two reduced maps, published by the Palestine Exploration Fund in 1871,—one giving "the Wilderness of the Wanderings" from the frontier of Sinai to the Dead Sea, as constructed from the route-surveys of Messrs. Palmer and Drake; and the other continuing the survey to the northward, and entitled "A Map of Moab," as it embodies the investigations of Captain Warren and Mr. E. H. Palmer in that province. Nor must I omit to notice in this series the very excellent sketch-map of the Peninsula of Sinai, which was presented to this Society by Mr. Holland in 1868, and which appeared in our 'Journal' of the following year.

The discovery of the famous monolith of Dhiban, has invested with a special interest the geography of the district of

* There are two official maps of an older date, which cannot be overlooked in a *résumé* of our geographical knowledge of Palestine, derived from British sources, as they really furnish the basis for all the later surveys. These are, firstly, "The Syrian Survey," executed by Captain Mansel, R.N., in 1861–62, and published for the Admiralty on three large sheets; and, secondly, Major Rochfort Scott's Map of Palestine, compiled from the surveys of several British officers in 1841, and engraved by Arrowsmith for the Foreign Office.

Moab, and it is important therefore to notice that the country has been examined on two recent occasions; firstly, by Messrs. Palmer and Tyrwhitt Drake, in continuation of their journey through the desert of the Tîh and Idumæa, and more lately by Dr. Tristram and Dr. Ginsburg, who obtained a special grant from the British Association for the purposes of their expedition. The country is not inviting to the traveller, the Bedouin being faithless and avaricious, and there being little of real interest to compensate for the danger and expenses of exploration. Mr. Palmer, indeed, than whom we cannot have a better authority, has left it on record that "above ground, at any rate, there is not another Moabite stone remaining." The details of Canon Tristram's expedition into Moab and Edom have not yet been made public; but it is known that his party were detained as prisoners at Kerak, and were only released at last through the intervention of the Turkish authorities.

Our old Fellow and correspondent Captain Burton, imagined, he says, that, "when he was transferred to Syria and Palestine, his occupation as an explorer was over;" but he soon found that although the highways of the country were well worn, there were large tracts in the interior wholly unvisited by Europeans; and to the examination of these tracts he accordingly devoted himself with his characteristic ardour, in his few intervals of leisure from official duty. At one of our recent evening meetings he thus gave us a very interesting account of a tour which he had made last year, in company with Mr. Tyrwhitt Drake, through the volcanic region east of Damascus; and he has since sent in a paper on the Anti-Libanus, which is of almost equal interest.

Asia Minor.—The regions both to the north and south of Syria have also been recently brought under the notice of the Fellows at our evening meetings. Mr. Gifford Palgrave, so well known for his adventurous journey through the Arabian Peninsula in 1867, has recently described to us a tour which he made last year from Trebizond into the interior of Asia Minor, and in which he detected unmistakable traces of glacial action on the plateau through which flows the Upper Euphrates, as well as in the valleys conducting from the plateau to the shores of the Black Sea. He visited the same general tract of country between Erzingan and Kara Hissar which had been previously described in the pages of our 'Journal' by Mr. Consul Brandt and Mr. Consul Taylor, but followed an independent route throughout, and thus added many fresh details of much geographical

interest to their published accounts. Major Millingen, equally well known as a soldier and an author, who commanded a body of Turkish troops for some years in this part of Asia Minor, and had thus enjoyed great facilities for examining the country, contested some of Mr. Palgrave's statements on the occasion referred to, and has since presented us with a paper on the mountains of Lazistan, which contains some interesting details.

Arabia.—In Southern Arabia the extension of our geographical knowledge has been not less marked. Captain Miles, Assistant to the Resident at Aden, has penetrated on several occasions into the interior of the country, thus adding largely to the geographical materials collected by Wrède; and he has further been fortunate enough to obtain several new copper tablets and other Himyaritic antiquities, such as coins and idols, besides a series of the rarest Arabic MSS. on the history and geography of Yemen. But the most important accession to our knowledge has been contributed by the Baron von Maltzan, who, although his personal exploration did not extend far from the sea-coast, in the neighbourhood of Aden, succeeded, nevertheless, by a careful and methodical course of inquiry among the Arab tribesmen, in reconstructing the map of Southern Arabia. In the country, indeed, extending from the mouth of the Red Sea as far as Macullah, and which answers to the Hadhramút of the Arab writers, Von Maltzan has recovered about 2000 names which were previously quite unknown, and has thus enabled Petermann to lay down a well-filled map, intersected by routes, and exhibiting clearly-defined physical features, over a space of some 500 square miles, which was formerly a blank in Geography.

Overland Communication.—A subject which has excited, and continues to excite, much public attention, from its close bearing on the national interests, has also thrown considerable light on the geography of Western Asia. I allude to the inquiry into the communication with India through Turkey by means of a railway from the Mediterranean to the Persian Gulf. This subject, which was partially investigated towards the close of the last session of Parliament, has now been under the careful and continuous consideration of a Select Committee of the House of Commons, for some months past, and a vast amount of evidence has been taken from travellers and others personally acquainted with the country, as to the practicability of the enterprise, and the best line of route to be followed in joining the two seas together. However much opinion may differ as to the advisability or necessity of a Government guarantee in order to float the

project—the question depending partly on the political value of our thus having a second or alternative line to India, and partly on the possibly remunerative character of the undertaking—it is, at any rate, satisfactory to observe that the witnesses examined by the Committee have been unanimous in affirming that no engineering difficulties are to be met with in any part of the line, with the exception, perhaps, of ascending Mount Amanus from the Mediterranean level, at the upper end of the line, and the bridging, if necessary, one of the great Mesopotamian rivers towards its lower extremity. The only notable disagreement, indeed, seems to have reference to the superior eligibility of a line by the valley of the Euphrates or by that of the Tigris, and on this point a good deal of evidence was taken of much interest to Geographers. To enable the Committee to understand more fully the geographical question, and especially in reference to the possibility of connecting the Mesopotamian line with Constantinople, a series of Consular Reports has since been put in by the Foreign Office, which pretty well exhausts the subject of the various practicable routes through Asia Minor. The reports, especially by Mr. J. Taylor, one of our most valued contributors, by Mr. Skene, and Mr. R. Wood, are, in fact, elaborate geographical essays, describing the passes of the Taurus and the physical features of Anatolia and Northern Mesopotamia, and, as such, would seem more suited to the pages of our own popular 'Journal' than to the dignified "limbo" of a Parliamentary Blue-book.

Map of Western Asia.—It is very agreeable to me, in connection with this subject, to be able to announce that the Indian Council—recognising the importance to the great empire over whose interests they watch, of placing before the public all available information with regard to the overland communication—have resolved to utilize the extensive materials at their disposal, in the construction of a large general map of the countries between the Mediterranean and the Persian Gulf. This work has been entrusted to Commander Felix Jones, of the late Indian Navy, who was himself resident in the country for about twenty-five years,—occupied partly in political and professional duties, and partly in conducting the Mesopotamian Survey,—and who, moreover, is one of our most accomplished draughtsmen and one of our best practical geographers, having served for several years upon the Council of our Society; and he expects to be able to accomplish his task in the course of the next eighteen months. This great map, bounded on the west by the Mediterranean, will

take as its eastern limit the line of frontier between Persia and Turkey, which was laid down with the most scrupulous accuracy and in minute detail, over a space of 1000 miles, extending from Mohamrah to Ararat, by the famous mixed Delimitation Commission, presided over, on the part of England, by Sir Fenwick Williams of Kars. The northern boundary of the map will be the line of Taurus, while on the south it will stretch far into the Arabian Peninsula, so as to include all the surveys and reliable route-tracks of Syria and Palestine, of Asia Minor and Kurdistan, of Mesopotamia, Babylonia, and Arabia. It will thus embody in one general view all the geographical work of the Palestine Exploration Fund, all the information scattered through the pages of our 'Journal' in the various memoirs of Burton, Palgrave, Wallin, Chesney, Consul Taylor, the Lynches, Ainsworth, Drs. Forbes and Ross, Messrs. Loftus and Layard, &c.; and more particularly it will exhibit, in a connected form, the highly instructive surveys of Babylonia and Chaldæa executed by Captains Felix Jones and Selby, Lieutenants Cellingwood, Bewaher, and other officers of the Indian Navy, which at present only exist in manuscript, and are thus not available for general reference.

Railway to India.—It is possible that the whole subject of the overland communication with India by means of a railway, in so far as regards the geographical character of the intervening countries, may come on for consideration before long at an evening meeting of our Society, as Mr. Andrews, to whose unwearied and persistent efforts it is mainly owing that the project has at length taken a substantive form, has undertaken to draw up a paper which shall place the main features of the case fairly before the public, and shall invite discussion thereupon. In such an event, we should have to consider, firstly, the comparative merits of three lines through Asia Minor: namely, the northern line through Amasia and Erzeroum to Tabríz; the centre line by Uzgát and Sivás to Diarbekir; and the southern line by Konieh and the Cilician Gates to Aleppo; we should then have to weigh the advantages of a line down the valley of the Euphrates, from Aleppo direct by Anuah and Hít to Grain on the Persian Gulf, against a proposed circuitous route down the valley of the Tigris, by Mosul and Baghdad to Bussorah or Mohamrah; and we should finally be called on to trace certain alternative lines through Persia,—the northern line leading either from Tabríz or Baghdad to Teherán, and thence passing by Herát and Candahár to the Indus, while the southern line would either circle round the

sea-coast from the mouth of the Euphrates to the mouth of the Indus, or, ascending the Persian plateau between Shuster and Shiráz, would follow a valley which is said to run due east between two parallel ranges from the vicinity of Kermán to our own frontier, at no great distance from Karachi.

Persian Surveys.—This last-mentioned line might receive some valuable illustration from recent Persian explorations, which I now proceed briefly to notice. The officers of Royal Engineers employed in superintending the Indo-European line of telegraph through Persia have on many occasions rendered valuable aid to the cause of geography; but nowhere have their services been more conspicuous than in the recent deputation of Captain Lovett to assist Sir Frederick Goldsmid in his arbitration commission on the Kelát frontier. Captain Lovett first travelled along a line from Shiraz to Bunpoor, which had been previously touched at different points by Pottinger, by Consul Abbott, and by Khanikoff, but had never been continuously surveyed, and he then proceeded to a reconnaissance of the disputed frontier, descending from Bunpoor to Guadur, on the sea-coast within the Persian boundary, and ascending from Guadur to Punjgoor, on the Belooch or eastern side of the frontier. Major Ross, the Political Agent on the Mekrán coast, had also on a previous occasion passed in a nearly direct line from Kej to Beileh, and the map accordingly—which has been constructed to illustrate these various travels and to furnish at the same time a definite record of the Perso-Kelát frontier, as finally decided on—exhibits a very marked improvement on the old skeleton maps, which contained nothing but the isolated routes of Pottinger and Grant. Captain St. John, R.E., has also still more recently accompanied Sir Frederick Goldsmid from Kermán to Seistán, in order to map the contested Perso-Afghán frontier about the delta of the Helmund River. Seistán has but rarely been visited by Europeans. Christie, early in the century, and Edward Conolly, Forbes, and Khanikoff, in more modern times, are the only travellers who have ever penetrated to the mysterious lake and its sacred island, so celebrated in Persian romance; and as all these travellers were more or less hampered in their movements by the jealousy of the natives—Dr. Forbes having, indeed, lost his life in Seistán, as I reported to this Society thirty years ago (see vol. xiv. p. 179)—it is probable that much new geographical matter may be collected by the present Mission. Sir Frederick Goldsmid was also joined in the vicinity of the lake by Colonel Pollock and Dr. Bellew, who had travelled from Candahár to Seistán, along the

banks of the Helmund, by a line never followed but by my Candahár assistant, Lieutenant Pattinson, in 1841; and the whole party has since adjourned to Teherán, where it is proposed that all frontier difficulties shall be discussed and adjusted, and where a map of the country will be constructed from Captain St. John's register of observations, which, for the first time, will give us reliable information as to the true longitude of the lake.

The Havildar's route.—Passing further to the east, our best thanks are due to Major Montgomerie, who, to his adventurous explorers, the Pundit and the Mirza, has now added a third anonym, known by his rank of Havildar. This bold, energetic, and well-trained officer passed, with his instruments, in a direct line through the mountains from Peshawer to Badakhshán, observing for latitude in the Swát, Punjkora, and Chitrál valleys, and keeping a careful field-book, from which his route has been protracted from the fixed points of the Trigonometrical Survey within our Indian frontier till it joins the Mirza's route at Fyzabád. There can be no doubt but that the Havildar incurred great personal danger in this journey, having been brought into direct contact with the chiefs of Chitrál and Yassín who compassed the death of Mr. Hayward, and that he owed his safety to a combination of boldness and discretion which is very rare in an Asiatic. It was intended that the Havildar should have passed on from Badakhshán, by Darwáz and Karategín, to Kokand; and it is greatly to be regretted that he was unable to follow out his instructions in this respect, as he would thus have cleared up the mystery of the double Darwáz and explained the geography of the country about the upper affluents of the Oxus, which the scanty data of Molla Abdul Mejid's return journey in 1864 have thrown ever since into deplorable confusion. The Havildar, on his return journey from Badakhshán, crossed the same passes (the Durah Pass, between the Oxus Valley and Chitrál, and the Lahouri Pass, between Chitrál and Dír) which were traversed by Pundit Munphool in 1866; but it must be remembered that the last-named traveller, however valuable his services as a Political Agent, was no observer, and that Major Montgomerie's *employé* is thus entitled to the merit of having for the first time defined the position of the Chitrál Valley—a line of country which, sooner or later, will assuredly be the high road of communication between India and the plains of Turkistán.

Yule's 'Marco Polo.'—In the brief address which I delivered to you at the commencement of the Session, I ventured to assert that the pub-

lication of Colonel Yule's 'Marco Polo' was the great geographical exploit of the year. That statement, I am happy to say, has been since confirmed by the unanimous verdict of public opinion. The amplitude of research, indeed, and the extraordinary care with which the geography of Central Asia has been explained by Colonel Yule, along the line followed by the Venetian traveller from the shores of the Persian Gulf to the furthest limits of China, and the still more curious dissertations which illustrate the return sea-voyage of the party, through the Eastern Archipelago and along the coast of India, may well excite not only the admiration but the amazement of ordinary students. The Council of our Society has shown its appreciation of this wonderful work by awarding to its author the Patron's Medal of the year, and it is my honest and deliberate conviction that the Medal has never been more worthily bestowed. I may add that Colonel Yule, notwithstanding his vast labours, seems to feel that the geography of Central Asia is far from being as yet exhausted, and that he is thus still gathering laurels and ministering to our instruction in this field of research, having recently contributed to the 'Journal of the Royal Asiatic Society' a very valuable memoir in explanation of the travels of the Chinese pilgrim, Hwen-Tsang, in the Oxus valley; and having also accumulated extensive materials for the further illustration of the province of Badakhshán, which he will either embody in his introduction to the new edition of Captain Wood's 'Travels,' or will publish in a separate form.

Shaw's 'High Tartary.'—Our other Medallist, Mr. Shaw, has also recently published a very interesting volume containing the narrative of his two expeditions into Turkistan. It will be remembered that Mr. Shaw visited Yarkand and Kashgar in 1868-69, at the same time as our own agent Mr. Hayward, and thus shared with that officer the credit of having re-introduced us to an acquaintance with those cities, after they had been lost for many centuries to European geography. Some interesting extracts from Mr. Shaw's journal were published at the time in our 'Proceedings,' and would have attracted more notice, but for the fuller narrative of his companion traveller, which occupied 100 pages of our fortieth volume. In 1870 Mr. Shaw, who had in the mean time returned to England, was summoned by telegraph to India, in order to proceed a second time to Turkistan in the *suite* of Mr. Forsyth, who had been officially deputed by the Viceroy to visit the court of the Ataligh Ghazí, and endeavour to open out a commercial intercourse between Yarkand and the

Punjab through Ladakh and Cashmere. On this journey Mr. Shaw explored a portion of the Karakoram Mountains that had not before been visited, and the letter which he wrote to Sir Roderick Murchison on the subject, and which has since been published in our 'Proceedings,' was noticed with the highest commendation in our President's last Anniversary Address. We have now Mr. Shaw's complete narrative of his two journeys,—a work of such authority and interest, as to have shared with Marco Polo the honour of being reviewed in a masterly article of the 'Quarterly Review;' and it is chiefly in acknowledgment of the merits of this work, and of the great value of the astronomical observations which were taken by Mr. Shaw during his journey, and which for the first time have fixed the longitude of Yarkand, that we have awarded him the Patron's Medal for the year. Still more recently Mr. Shaw has furnished us with some curious information respecting the probable site of the lost city of Pein, and he has further confirmed, from local information, Colonel Yule's correction of the longitude of Charchand and Lop. His latest contribution, too, has, in a geographical point of view, been particularly valuable, since amongst the itineraries which he has obtained from native travellers, there is one, leading from the Pangong Lake to Khoten through the Aksai Chin, considerably to the eastward of the line by Leh and the Chang-Chenmo Pass, which clearly proves that the Kuen-Luen chain does not stretch away at the same elevation, as had been sometimes supposed, to the south of the Taklá Makán desert, but on the contrary, slopes gradually down from Kiria eastward into the Thibetan uplands, and is hardly to be recognised as a continuous range beyond the meridian of 85° east longitude.

River Oxus.—Before quitting the subject of Central Asia, I desire to say a few words on the geography of the Oxus. As this river, from the 66th meridian to the eastward, has been adopted as the frontier between the Uzbeg and Afghan States, and will thus in all probability mark in due course of time, the line of division between the Russian and British-Indian Empires, the definition of its course and the investigation of its many affluents have become of great importance to Political Geography. The accumulation of materials for a "Monograph on the Oxus" has accordingly occupied much of my leisure time for the last two years, and although Sir Roderick Murchison's announcement in his last Anniversary Address that the Memoir would be published in our 'Journal' of this year cannot now be realized, still I am able to say that the paper is very nearly

completed. The first portion of the Memoir, indeed, which treats of the antiquities of the Oxus Valley, and which was read before the Geographical Section of the British Association in 1870, has been already printed, and the second and third portions are in a very forward state. In the second portion, which is devoted to a careful delineation of the Upper Oxus, from its source in Pamír to the confines of Kharism, I have derived great assistance from the geographical work of Ibn Dusteh, an author of the third century of the Hejreh, who gives a more detailed and methodical account of the hydrography of this part of Asia than is to be found in any other Oriental writer. Ibn Dusteh describes four river-systems as combining to form the Oxus:—1stly. The true Jihún, rising in Thibet (Thibet was a general name for the country east of Badakhshán), and flowing westward, through Vakhán, under the name of the Vakháb. (This is the modern Panjeh.) 2ndly. The Vakhsháb, rising in the upper country of the Kharlukhiéh Turks, and passing in succession through the districts of Pamír, Rásht, and Kumid (Roshan and Kum), to the famous "stone bridge," and uniting with the Vakhháb at the ford of Mileh. (This is hardly reconcilable with the usually received identity of the Surkháb and Vakhsháb, and rather points to the Kárákúl branch of the Oxus, which may perhaps, after all, be the real Darwáz River.) 3rdly. The Rámid, rising in the hills above Rásht, and flowing towards Chagánián, where it is joined by the Kam-rúd, the Nihám-rúd, and the Kháwer-rúd (*i. e.* the various branches of the Hissár River), which come from the mountains of Búttúm and those of Sinám, Nihám, and Kháwar. It finally passes Baraghán, on the Vakháb (modern Bulgewan), and Kovádián, and joins the Jihún above Termid. (This mention of Sinám in connection with Nihám, now called Kafir-nihán, suggests that the famous fort of Mokanna, "the veiled prophet," was at Hissár.) And 4thly. The river-system of Badakhshán, formed of the Fargham (river of Jerm), the Vartán (Bartan of Edrisi, Ortanj of 'Timur's History' and modern Vardoj), and the *Jilan* (a doubtful name, perhaps the Sir Gholam of Wood). This notice, which is far more detailed than that of the standard geographers, Istakhrí, Ibn Houkal, Edrísí, &c., has never before been published, and its value will be at once appreciated by those who have investigated this very obscure, but, under present circumstances, not unimportant subject.

The third portion of the "Monograph on the Oxus" refers to the delta of the river, and traces up the history of the several changes

of its course between the Caspian and the Aral, from the earliest times to the present day. My general views on this subject, which, however, were disputed by Sir Roderick Murchison, formed the subject of an address, which I delivered to the Society in 1867, and they have recently been placed before the public in more detail; but in a matter of so much interest, the evidence adduced cannot be too minute and circumstantial, and I propose, therefore, in the Monograph in question, to quote all the original authorities—not only Greek and Latin, but Arabic, Persian, Turkish, and Russian—proving, as I hope, from their united testimony, that the deflection of the waters of the Oxus into the Aral having been caused in modern times—not by any upheaval of the surface of the Turcoman desert, but by the simple accidents of fluvial action in an alluvial soil—the restoration of the river to its old bed debouching into the Caspian, which is now under the serious consideration of the Russian Government, is a work of no engineering difficulty whatever, and will thus be assuredly accomplished as soon as the neutrality of Khiva is secured either by negotiation or by arms.

Indian Surveys.—During the season of 1870-71 the Great Trigonometrical Survey, proceeding on six series of triangulations, completed 11,203 square miles of principal and 10,076 of secondary work. In Assam, the party under Mr. W. C. Rossenrode encountered considerable difficulties, the plains being covered with grass 12 feet high, the hills clothed with dense forest, and the smoke from the burning jungle often forming a dark canopy which obscured the view. The whole party also suffered from fever, and the progress made, in the face of such obstacles, is creditable to the perseverance and resource of Mr. Rossenrode and his fellow-workers. Progress has also been made with the Brahmaputra, Beder, Bilaspur, and the two Bangalor Series. The topographical operations under the Superintendent of the Great Trigonometrical Survey have been carried on in Guzerat, Kattywar, and the Cosi Valley; and two parties under Captain Herschel and Lieut. Trotter have been at work on latitude observations.

It is considered a most important object to have the Russian and Indian geodetical operations in the same terms, and this has been effected to some extent by an interchange of instruments. Cape Comorin is already connected with two stations north of Changchenmo, and if the Russians bring their triangulation to their outposts on the Tien-shan, the two surveys will only be separated by a distance of 400 miles across a country presenting no physical

difficulties. Thus the connection of the Russian and Indian triangulations may be looked forward to as a great work to be achieved by the present generation.

In September, 1871, Colonel Walker, the Superintendent of the Great Trigonometrical Survey, who is now on leave in England, ascertained the longitude of Teheran by telegraph from London, in communication with Major St. John, R.E., of the Persian Telegraph Department. The signals were sent through the line of the Indo-European Telegraph Company, the Greenwich times of the signals being ascertained by a clock in the Telegraph Office, which was governed by a clock in the Greenwich Observatory, while the Teheran times were determined by sextant observations on the spot by Major St. John. Considerable interest attaches to this operation from the circumstance that, though the distance from London to Teheran along the telegraph line is 3870 miles, and it was necessary to employ automatic relays at five intermediate stations, the entire retardation of the electric current in either direction was found to average less than half a second. Thus there is much reason to hope that, when the necessary instruments are available in India, exact and final determinations of the differences of longitude of the Greenwich and Madras observatories and the stations on the arcs of parallel of the Indian Survey may be obtained without any serious difficulty. The value now determined for the longitude of Teheran is 51° 24′ 5″ E. of Greenwich. It differs by less than half a mile from the value which had been previously deduced by Major St. John by combining a telegraphic determination of the difference between Teheran and Kurrachee, which was made by himself, with the trigonometrical difference between Kurrachee and the Madras observatory, which is furnished by the operations of the Great Trigonometrical Survey of India; and assuming for the Madras Observatory the latest and most exact longitude, 80° 14′ 20″ E. of Greenwich. This close coincidence between two independent results may be accepted as a sufficient proof that there can be no very material error in the adopted value for the Madras Observatory; and this is a matter of some consequence, as all the most important determinations of longitude in India have invariably been referred differentially to that observatory.

Colonel Walker has completed the first volume of the 'History of the Great Trigonometrical Survey,' and we have been presented with a copy by the Secretary of State for India. As a record of accurate geodetical measurement, and of arduous services well per-

formed, this great work will yield to none that has hitherto been published by any European nation, either in interest or in scientific importance. It contains a very interesting introductory account of the early operations of the survey from 1800 to 1830; but the main body of the work is devoted to a detailed description of the standards of measure, and a record of the measurement of the base-lines.

Six Topographical Survey parties have been at work during 1870-71, under the superintendence of Colonel Thuillier, the Surveyor-General of India, which, together with the Revenue Survey parties in the Bengal Presidency, have completed the mapping of 31,530 square miles. These parties have been at work in Gwalior and Central India, in the Vizagapatam Agency, in the Central Provinces and Rewah, in Malwa and Bhopal, in Khandesh, and in Rajputana. A party, under Captain Badgley, has also accompanied the Looshai expedition, starting from Cachar; and a very valuable contribution to the geography of the eastern frontier of India may be expected from its labours.* Colonel Thuillier has shown his usual activity in publishing useful maps and in meeting the demands of administrative departments, as well as those of the public. As many as thirteen new quarter plates of the Indian Atlas have already been engraved and published at Calcutta, and twenty-one more are in various stages of progress; but the European engraving staff urgently needs to be enlarged. Several important general maps have also either been published, or are in course of publication under Colonel Thuillier's auspices. Among these may be mentioned new general maps of Oudh and Sindh, a very useful map of the eastern frontier, including parts of China and Burmah, and a new map of Orissa.

The Revenue Surveys in India have not hitherto contributed much to our objects, as more attention has, as a rule, been paid to questions relating to the settlement and assessment of the land than to the preparation of materials for maps, in the conduct of these operations. But a really good Revenue Survey, while furnishing complete information for settlement purposes, should be executed throughout on accurate principles, and supply materials for compiling maps for general use. Such a system has always been advocated by Colonel Thuillier; but in the Madras Presidency alone has any approach to a compliance with all these demands been

* It has been recently reported from India that, during the continuance of the Looshai Expedition, the officers of the Survey Department have extended their operations from Cachar on the north to Munnipoor on the south, including within their series of triangles an area of about 4000 square miles.

effected. The Madras Revenue Survey, therefore, is the only one that can at present claim much attention from geographers. Under the able superintendence of Colonel Priestley it has been executed on strictly accurate principles in every stage, and, up to March 21st 1871, the number of square miles that had been surveyed was 41,043. As it is connected with the points of the Great Trigonometrical Survey, it can be made available for geographical purposes by combining the village maps, and publishing them, on reduced scales, as Talook maps. These, again, will be combined to form district maps; and one of the latter is now under compilation. Our thanks are due to Colonel Priestley and his Staff for having, while engaged in the arduous task of defining boundaries, fields, and villages, for fiscal purposes, taken care that their work shall also be available for the construction of useful general maps.

The question of marine surveys is still under the consideration of the Government of India; but the importance of adopting effective measures for securing the due execution and continued revision of marine surveys and charts, is strongly felt both in India and in this country. The Madras Government have reported that several important surveys require to be made along the coasts of that Presidency, and that others require periodical revision. The Bombay Government have shown their sense of the great importance of marine surveys by the measures they have recently adopted. From March to June, 1871, Mr. Girdlestone was engaged, in the schooner *Constance* of 186 tons, in surveying the large inlet of Khor Rapsh on the Mekran Coast, between Jask and Chabor, of which he has completed a chart; and the same vessel, commanded by Mr. Chapman, has since been surveying the reefs near Bahrein in the Persian Gulf. On the Bengal side, a survey of the creeks and rivers on the coast of Orissa was completed in 1870-71, by Mr. Harris, an experienced river surveyor, and the charts are being prepared for publication on a small scale at Calcutta. But it is not desirable that these desultory operations should be undertaken by the different local Governments as the need arises, without any combined or systematic plan, with wholly inadequate means, and with an apparent absence of appreciation of the necessity for executing such surveys on rigorous trigonometrical principles. The adoption of effective measures for securing the due execution and continued revision of marine surveys and charts on the coasts of India, is a want which yearly becomes more urgent.

During the autumn of 1871 another portion of the mountain-

region, which bounds India on the north, was examined by Mr. W. T. Blanford, of the Geological Survey. During three months' leave this accomplished traveller, with the main object of studying the zoology of the eastern and northern frontiers of British Sikkim, reached the Donkia Pass, 18,500 feet above the sea, and obtained a view of Tibet. He also ascertained the position of another pass never before laid down in any map, and met with three unmapped lakes. Since Dr. Hooker and Dr. Campbell explored this region in 1849, only one European had penetrated to the Donkia Pass previous to Mr. Blanford's visit last year. Mr. Blanford, who did such excellent work in Abyssinia, has now joined Sir Frederick Goldsmid on the Seistán frontier, and we may confidently anticipate much valuable information from him, regarding the geology and zoology of a country almost entirely unknown. Before concluding my notice of the labours of surveyors and geographers in British India, I may mention that the officers of the Quartermaster-General's Department, under the auspices of Lieutenant-Colonel MacGregor, are engaged in collecting materials for gazetteers of the different countries in Central Asia, and that translations of Meyendorf's journey to Bokhara by Captain Chapman, and of Muravief's visit to Khiva by Captain Lockhart, have recently been published at Calcutta. Both these young officers served in Abyssinia, and are Fellows of our Society. Some valuable memoirs on different districts in India, containing geographical information, have also been published by Members of the Civil Service. Among these I may mention the Report on Jessore by Mr. Westland, and the Memoir on Ghazeepore by Mr. Oldham. The former work contains an interesting description of the river-system in the Jessore district, and of its changes during the past century, including information on the progress of the formation of the Gangetic delta. I may add that a vast amount of very valuable geographical material is being collected and arranged by officers who are preparing memoirs on their respective districts in all parts of India.

Anderson's Report on the Expedition to Western Yunan.—Dr. John Anderson, who accompanied, as scientific observer, the expedition of Major Sladen from Burmah to the frontiers of Yunan, has recently published in Calcutta his narrative of the journey. Previously we had no detailed information of this important undertaking beyond the Official Report of Major Sladen and a short paper communicated by him to the Society, of which some account was given in the

Presidential Address of last year. The large and handsome volume now received is a most important contribution to our knowledge of the country lying between the Upper Irrawaddy and the Western frontier of China—a region interesting as forming the ancient commercial highway between Western China and Burmah, and consisting of a series of long elevated valleys of great fertility, peopled by the Shans, a race distinct both from the Burmese and the Chinese, and the seat of an ancient empire. Dr. Anderson treats his subject in an exhaustive manner; one-half this volume consisting of a series of pregnant chapters on the following subjects:—1. A critical account of the former History of the country. 2. The Wars between Burmah and China. 3. A review of the Work of all former Travellers in the region. 4. The Physical Geography and Geology. 5. The Ethnology, which contains a great amount of valuable information regarding the Shans, Kakhyens, and other races to the east of Bhamô. 6. On the Mahommedans in Yunan, comprising a history of the rise and progress of this sect, and an account, which at the present time is of special importance, of the Panthays, who have erected an independent Mahommedan kingdom at the expense of the Chinese Province of Yunan. 7. The trade-routes of Upper Burmah; and, finally, 8. On the Irrawaddy and its Sources; on which subject Dr. Anderson had previously communicated a paper to our Society, which was printed in the 40th volume of the 'Journal.' The rest of the volume is occupied by a narrative of the journey from Mandalay to Momein and back, and by a number of Appendices, all of which are of value to the inquirer. It is seldom, indeed, that we have to record the appearance of a book of Travels, so complete and so rich in solid information as the present. Nevertheless its painstaking author announces in the preface that it forms only the first section of his Report—the second, which is soon to follow, relating to the Natural History of the region, more especially belonging to the appointment he held as Naturalist to the Expedition.

Russian Asia.—The progress of Russia in Asia continues to be an absorbing topic of interest to geographers, owing to the new fields for exploration which are being opened out in the remote regions which have remained for so long a time inaccessible to European travellers.

Since 1868, in which year her empire was enriched by the acquisition of the fertile region between the Jaxartes and the Oxus, and the possession of some of the most wealthy and populous cities of

Central Asia, the efforts of Russia have been chiefly turned towards the consolidation of her new dominions, to the development of their resources and of her Asiatic trade, and to the improvement of the means of communication with these distant provinces. The surprising rapidity with which, during the last ten years, lines of railway have been constructed over the whole extent of Russia in Europe, justify the expectation that in a few years railroads will be laid across the Kirghiz steppes, which intervene between Orenburg and Turkistan. With the view of establishing a new and direct route to Central Asia, by way of the Khanat of Khiva and the Amu Daria, an expedition was sent in the autumn of 1869 to explore and survey the old bed of the Amu Daria, and the steppes of Turcomania, lying to the east of the Caspian. This expedition landed at Krasnovodsk Bay, which is situated in the Gulf of Balkhan, in the 40° parallel of north latitude, on the south-east shore of the Caspian, and immediately opposite the port of Baku, in Daghestan, from which it is only 200 versts distant. Its position is, therefore, well adapted to serve as a base of operations against the still independent Khanat of Khiva, and it will probably become at some future time a great *entrepôt* for the trade between Asia and Europe. Although the unsettled state of the Kirghiz Steppes and the jealousy of the Khan of Khiva have hitherto greatly retarded the progress of the expedition, and have interfered with the scientific investigations of the officers who accompanied it, some interesting details have been communicated to the Imperial Geographical Society.

The topographical labours which have been executed over a distance of upwards of 1000 miles in the directions of east and south-east from Krasnovodsk Bay, combined with astronomical observations for determining the latitude and longitude of the most important places, will now enable Russian cartographers to draw accurate maps of the country east of the Caspian, part of which had not previously been explored by Europeans. Springs of fresh water have been discovered in abundance in the old bed of the Amu Daria; and it is anticipated that, if no greater difficulties are met with in that portion of the river-bed which has not yet been examined, a good caravan-route will, in course of time, be established between Krasnovodsk and Khiva. The studies which are being made in the different branches of natural science are as yet too incomplete to do more than serve as a basis for the further investigation of the basins of the Aral and Caspian seas.

When these explorations have been more extensively prosecuted, and their results elaborated, our geographical knowledge of these vast plains will be much improved.

The *north-west of Mongolia* has been mapped by M. Veniukoff from the itineraries of Russian travellers who have explored it of late years. Among these we will mention M. Printz, who went to Khobdo in 1862; M. Schishmareff, who travelled from Urga to Uliasutai in 1868; and M. Matusoffsky, whose interesting journey in 1870, from the frontiers of Western Siberia to Khobdo, and Uliasutai, and thence to the north, to the sources of the Yenissei, and to Minusinsk, is a valuable addition to our knowledge of a region hitherto almost unexplored. M. Veniukoff's researches demonstrate that the position of Khobdo must be moved considerably to the east of the meridian 107° 45′ assigned to it by Klaproth in his map of Central Asia. Veniukoff proposes to place this town in the parallel of 48° 7′ N. lat., and in the meridian 109° 18′ long. E. of Ferro, thus altering its position 74 miles, as compared with Klaproth's map. The position of Lake Ike-Aral must also be rectified, as well as the axis of the chain Ektak-Altai, which in Klaproth's map forms too acute an angle with the meridian. The position, however, of Uliasutai appears to be quite correctly marked on the old map.

In Turkistan M. Schépeleff has explored the district of Kuldja, and has communicated some valuable information on its geographical position, local character, the different tribes which compose its population, and the mode in which they are distributed. He has also given an interesting description of his expedition across the Moudjart Pass in the Tian-Shan, from its northern slope to the outpost of Mazar Bacha, in the territory of Kashgar, near the *mer de glace* on the southern slope of the Thian Shan. A still more important journey, in this part of Asia, is that of M. Fedchenko, from June to August, 1871, to the northern part of the Pamir Steppe. A preliminary account of this exploration only has at present appeared, and in the Russian language, printed at Tashkend. Southward of Khodjend he describes the route as ascending a succession of terrace-like steppes, and the road thence led from Waruch, by the Hodja-Chiburgan Gorge, to the Chiptyk Pass, 12,000 feet above the sea-level. Peaks rose in the vicinity to a height estimated at between 18,000 and 19,000 feet, with immense glaciers, carrying lateral moraines, between them. This part of the mountainous region is described as excessively rugged and difficult to travel over.

The author regretted he was unable to reach Karategin, which at that time, owing to political causes, was inaccessible to travellers coming from Khokan.

A new map of Khokan has been made by M. Struve, from his recent astronomical observations. In China some enterprising Russian travellers have been engaged during the last year in exploring the upper valley of the Yellow River, under the auspices of the Imperial Geographical Society of St. Petersburg. After passing through Kalgan, and crossing the desert of Gobi, they entered the mountains of Suma-Khodo, about 80 miles north-west of the town of Kuku-khoto, and visited the country of the Urutes, the Ordos, and Alaschau, in south-eastern Mongolia. According to the last accounts they had returned to Pekin for supplies of money and provisions, preparatory to another expedition, in which they hoped to penetrate to Kuku-nor.

Among the other scientific expeditions which have been organized by the Geographical Society at St. Petersburg, that of M. Paliakoff to the lacustrine region of the Government of Olonetz, between Lake Onega and the frontiers of the Government of Archangel, deserves to be noticed as of special interest to naturalists. Attention should also be directed to Baron Maydell's expedition to the country of the Tchuktchis, in Northern Siberia, as well as to the ethnological and statistical expedition to the western provinces of Russia and Russian Poland, under M. Tchubinsky.

We have recently received the first publication of the Caucasian Section of the Imperial Geographical Society of Russia, whose Secretary, M. Kowalevsky, informs us by letter that the Section has been established with the view of studying the geography of the Caucasus and its adjacent districts.

Manchuria.—A paper giving an account of a Journey in the Northern Provinces of Manchuria, by Mr. Thomas Adkins, Consul at Newchwang, was communicated to me, a few weeks ago, by Sir Rutherford Alcock, but I regret to say it cannot be published until a portion of the manuscript, lost through accident, is replaced by the author. The paper narrates the incidents of a journey made by Mr. Adkins, from the city of Kirin to Ninguta and other places east of the Sungari River, and describes, in a graphic manner, the many curious physical phenomena observable in that part of Manchuria. The Sungari, whose blue waters rival in hue those of the Lake of Geneva, is described by the author as a picturesque and magnificent stream, flowing through a richly-wooded country. As

is well known, this fine river, a southern tributary of the Amur, is navigable as far as Girin, by large vessels from the mouth of the Amur, a Russian steamer having ascended it in 1859. The volcanic or lava region near the River Hurka, and the lake and waterfall formed by that stream, were also visited and described. It is to be hoped that the missing parts of this paper, which will form a valuable addition to our knowledge of Northern Manchuria, will be supplied by the author, so that we may be able to read it at one of our meetings during the next Session.

The Archimandrite Palladius, whose journey through Manchuria formed the subject of discussion at one of our meetings this year, and will appear *in extenso* in the next volume of the 'Journal,' has returned to Pekin by sea after visiting the ports on the seaboard of Russian Manchuria, and completing his researches on the archæology and ethnology of that country.

AUSTRALIA.—*First Discovery of Australia.*—I have been informed by Mr. Major that, on the 14th March, he read before the Society of Antiquaries a paper entitled 'Further Facts in the History of the Early Discovery of Australia,' which, though antiquarian, is too important to the history of geography to be omitted from this record of the year's doings. In 1861, Mr. Major had made known, for the first time, through the medium of that Society, the fact that Australia had been discovered in 1601 by a Portuguese named Manoel Godinho de Eredia,—an announcement which made the date of the first *authenticated* discovery five years earlier than had been previously accepted in history, and transferred the honour of that discovery from Holland to Portugal. The only evidence of this fact which Mr. Major was able to adduce at the time, was a MS. map (and that not original), which stated that the discovery had been made under the orders of the Viceroy Ayres de Saldanha, but corroborated by a printed Portuguese document, which showed that the discoverer had really been engaged in similar explorations under the orders of the said Viceroy's predecessor. Quite recently, however, there has been found in the Royal Burgundian Library at Brussels, Eredia's original autograph report of this discovery to King Philip III., accompanied by views, charts, and portraits, which it is hoped that the Chevalier Portuguese Minister at Brussels will have an authorisation and credit from his Government to publish.

Meanwhile Mr. Major's researches had led to the disclosure of a

fact of equal, if not of greater, importance than this. In 1859, he had called attention, in his 'Early Voyages to Terra Australis,' to some half-dozen French MS. maps of the world—most of them in the British Museum—on which Australia was laid down at a very much earlier period than that just mentioned, but with no record of the name either of a discoverer or of a ship, nor any statement of the period at which the discovery was made. Some of these maps were undated, but the oldest written date was 1542. On the country representing Australia, named Jave la Grande, were names of rivers, capes, and bays, which Mr. Major, in common with others who had commented on these maps, had taken for Gallicized Portuguese, and hence inferred that the Portuguese were the discoverers. It so happened, however, that, about three months ago, an engraved map of the world, recently purchased by the British Museum, fell under Mr. Major's notice, on which, though in a very much vaguer manner, Australia appeared to be indicated under the name of Regio Patalis, while the map bore the remarkably early date of 1531. The map itself was made by Oronce Finé, a celebrated astronomer and mathematician, of Briançon, in Dauphiné. This remarkable circumstance that all the maps of the first half of the sixteenth century indicating Australia, proved to be French, while a magnificent Portuguese portulano, of the date of 1558, showed a perfectly blank space where Australia should be, led Mr. Major to the question, whether the names on the "Jave la Grande," which he had previously taken to be Portuguese, might in any way be French. Calling to mind that the whole of Southern France, from Gascony to Provence, was occupied by branches of the old Langue Romane, he consulted the dictionaries of these languages, and found that the inscriptions in question were Provençal. A further examination of the inscriptions confirmed the conclusion, while one of the maps —dedicated to Admiral Coligny in 1555, and now in the Dépôt de la Guerre in Paris—bore the name of a Provençal pilot, named Guillaume le Testu, a native of Grasse. The logical deduction from this collection of evidence is that those who, in those early days, were alone able to lay down on maps a country which can be demonstrated from our present knowledge to be Australia, were the discoverers of that country, and that those discoverers were Frenchmen. The question then naturally arises, whether they could have had any predecessors in this field of discovery. Mr. Major's subsequent researches, which he has communicated to me, effectually remove this doubt. In

a letter addressed to Giuliano de' Medici by Andrea Corsali, a Florentine navigator in the Portuguese service, under date of May 6th, 1515, occurs the following passage:—"Eastward of Sumatra are the islands where grow cloves, nutmeg, and mace, lign-aloes and sandalwood; and still eastwards they say is the Land of the Pigmies, which, in the opinion of many, is connected southwards with the land of Verzino, which, from its great extent, is not yet at this part explored, but they say that to the westward it is connected with the Antilles of the King of Castile." The word "Verzino" undoubtedly means Brazil, and, as the language indicates, reference is here made to a vast continent supposed to surround the South Pole, taking its rise, on sixteenth-century maps, in the land immediately south of the Straits of Magellan; and Mr. Major is of opinion that this very sentence proves a knowledge of those straits more than six years before Magellan passed through them, and that the Pigmies are the Fuegians, whom we know to be the smallest and most degraded specimens of the human family. The portion of this great southern land referred to by Corsali is unquestionably New Guinea, for the north coasts only of the Spice Islands alluded to—viz. Java, Sumbawa, and Flores (the two latter discovered by the Portuguese in 1511)—were at that time known, and an eastward course thence would lead, not to Australia, but to New Guinea. Moreover, Gerard Mercator, in his great map of 1569, has lent the weight of his opinion to New Guinea having been here referred to. It would be difficult to adduce any stronger proof than this that no exploration of Australia had at that time taken place; and if we recall the fact that, even so late as 1558, the Portuguese portulano of Diogo Homem takes no cognizance whatever of Australia, we must own that the French are without a rival in the field. Indeed, even if this important continent could be shown to have been sighted earlier by any other people, of which we possess no evidence, the merit of laying down the east and west coasts on maps as early, if not earlier, than 1542, is a fact of too practical a nature to be overlooked. It is not unreasonable to infer that Guillaume le Testu was himself engaged in some, at least, of the explorations on which these maps are based, (1) because Provençal names of localities are clearly to be ascribed to a Provençal discoverer; (2) because André Thenet, cosmographer to Henri II., boasts of having often sailed with Guillaume le Testu, and styles him a "renommé pilote et singulier navigateur;" (3) because one of the Capes on the West Coast of the "Jave la Grande" of the French maps is named "Cap

de Grace"—without doubt so named from the birthplace of this navigator, who on his own map styles himself, "de la ville Francoyse de Grace." It only remains for us to hope that, like as the original autograph confirmation of that first Portuguese discovery which, after the lapse of 260 years Mr. Major was the first to make known, has at length come to light, so we may some day have the pleasure of reading the original narrative of that yet earlier discovery by the French, of which the French themselves are as yet unaware, with which his researches have now made us acquainted.

Telegraph-line across Australia.—Since the last Address, in which the commencement of the great work of laying a line of telegraph across Australia, from Adelaide to Port Darwin, was mentioned by my predecessor, the operations of the engineers and surveyors have made much progress, without, however, bringing the undertaking to a conclusion. I have lately received from the Colonial Office a copy of a Report by Mr. Todd, the Superintendent of the Telegraph, dated from Roper River, in the Northern Territory, the 16th of February last, in which an account is given of the efforts that were then being made to complete the line, over the space some two hundred miles in length, not at the northern end, but in the interior towards the head of the Roper, between 200 and 300 miles south of Port Darwin, which is still wanting to bring the cities of our great Southern Colonies into direct telegraphic communication with Europe. The surveying operations incident on the progress of this work have already led to geographical explorations of no little importance; the most interesting of which is the ascent of the River Roper by the vessels carrying the material and supplies to the working parties, and which has proved this stream, disemboguing on the western shore of the Gulf of Carpentaria, to be a navigable river. The ascent of the river by two steamers to a distance of 100 miles, is narrated in Mr. Todd's Report, and it is stated that vessels drawing 12 or 14 feet of water can easily go up to that distance, 3 to 9 fathoms' depth being always found, except in a few wide reaches where the channel could be easily deepened. The general width of the river for the first 50 miles is from 400 to 500 yards, and it is bordered by a wide tract of alluvial land, subject, however, to inundations.

New Guinea.—Intelligence has been received from time to time, within the last few years, which affords some ground for the belief that the Papuans of New Guinea are not so incorrigibly hostile to white men as they have generally been supposed to be. At any rate this seems to be the case with regard to the inhabitants of the

Southern Coast, in the neighbourhood of Torres Straits, trading-vessels from our Australian colonies having occasionally landed at different points on this coast and having met with the most friendly treatment on the part of the natives. My predecessor had occasion to record the visits of Captain Delargy and Lieutenant Chester to this part of the great island, both of which gentlemen spoke of the friendly demeanour of the natives, when treated properly and approached under suitable precautions. Since then, Sir Charles Nicholson, who has for a long time past advocated the geographical exploration of New Guinea, placed in my hands a short account, which he had found in an Australian newspaper, of another amicable reception of a trader on the same part of the coast.

Whilst these desultory visits were being paid to the southern side of New Guinea, a Russian *savant*, M. Miklouka Maclay, has been quietly pursuing his investigations on the northern coast in Astrolabe Bay. At least it is supposed that he has been so occupied, for no news has been received from him for some time past, and the anxiety of his colleagues in St. Petersburg has been such, that Admiral Lutke, in March last, addressed me, on the part of the Imperial Academy of Sciences, with a view to obtaining the good offices of our Society, in ascertaining the safety of the too-adventurous explorer. It was stated that M. Maclay had been deposited, with his two servants, well furnished with provisions, arms, and ammunition, in Astrolabe Bay, by a Russian corvette, about a year previously, and that nothing had since been heard of him. On the receipt of Admiral Lutke's letter, it afforded me much gratification to carry out his wishes, in so far as to address the Governors of New South Wales and Queensland, requesting them to recommend the masters of any vessels which might be leaving the ports of those colonies for the neighbourhood of New Guinea, to make inquiries, and, if possible, to find and assist M. Maclay.

Borneo.—A very interesting paper on the interior of the northern part of this little-known island has been read during the session, from the pen of our Associate, Lieutenant De Crespigny, who has been long resident in Northern Borneo, and whose familiarity with the languages and customs of the natives and knowledge of Natural History render all that he communicates well deserving of attention. The paper I now allude to describes the Padass River, and the Muruts and other tribes of indigenes inhabiting its banks. The Padass, and several other streams, more or less parallel, running south and west, take their rise on the slopes of Mount Kinibalu, and

flow through a fertile plain. Many original observations on the orang-otan and on the botanical productions of the region are given, besides vocabularies of five of the native languages. In a recent letter Lieutenant De Crespigny offers himself to explore the interior of New Guinea, under the auspices of the Society.

Formosa.—Our knowledge of the savage interior of this interesting island is gradually although slowly increasing. In former years Consul Swinhoe contributed a paper on its geography and ethnology, and since then Dr. Collingwood has published an account of a journey across a portion of the interior. But the descriptions of these able naturalist travellers related almost exclusively to the northern and more accessible part of the island. In the last number of our 'Proceedings' will be found an account of 'A Visit to Tok-e-Tok, Chief of the Eighteen Tribes,' by Mr. T. F. Hughes, of the Chinese Customs, which gives us much information regarding Southern Formosa. The aborigines of the southern part of the island had hitherto possessed an evil reputation for their barbarous treatment of the crews of vessels shipwrecked on their coast; but, according to Mr. Hughes, whose mission was in connection with a disaster of this kind, and who happily recovered the crew uninjured, the savages are always ready to meet kindness with kindness, and he and his party were received with great hospitality. Judging from some observations given by Mr. Hughes on the climate of Formosa, this island enjoys a great advantage over the opposite mainland of China. During the north-east monsoon, from October to May, the temperature is similar to that of Italy and the south of France, and the heat during the south-west monsoon is far from being so great as that of any part of the Chinese coast south of Tientsin.

Japan.—Our Medallist, Captain Blakiston, has added to his geographical reputation by his recent journey round the island of Yezo, an account of which was read by Sir Harry Parkes at our meeting of the 12th February last. During this journey Captain Blakiston gathered a large amount of information regarding the inhabitants, productions, and resources of this interesting and little-known island. Having been long resident at Hakodadi, the chief Japanese settlement in Yezo, situated in the extreme south, he was well qualified for this undertaking, and he had besides the advantage of travelling as a Japanese official. He went by ship to Hamanaka, on the south-eastern coast, and disembarking there with his servant on the 6th of October, 1870, journeyed by land round the shore, completing the tour of the island, a distance of 895 miles, by the 29th of November,

and finding hospitality at the *Quaishos*, or Japanese trading and fishing stations, which are met with at intervals throughout the coast country. The aboriginal population of Yezo, as is well known, consists of the singular race of hairy men, called Ainos, concerning whom Captain Blakiston gives some interesting details. Their total number, however, is estimated at 25,000, which is but a small population for an island somewhat larger than Ireland. The resident Japanese number some 120,000 souls. The whole interior of the island is very scantily peopled and but little known, even to the Japanese. At present this large island is profitable to the Japanese only from its fisheries; but the southern and western parts are rich in mineral productions—gold, silver, lead, iron, petroleum, and coal —so that a more prosperous future may safely be anticipated for this extreme northern part of the Japanese empire.

Until recently the coasts of Yezo had never been properly surveyed, and the form and position of its eastern and northern shores, as shown on our maps, were quite erroneous. A survey, conducted in 1871 by Commander H. C. St. John, in H.M.S. *Sylvia*, has remedied this defect, and the Admiralty charts of the island will in future give its coast-line accurately. Commander St. John's Report to the Hydrographer contains also some interesting particulars relative to the inhabitants, productions, and climate of Yezo, and will be published in our 'Journal.'

SOUTH AMERICA.—In the last Annual Address mention was made of an important contribution to our knowledge of the rapids and cataracts of the River Madeira, resulting from the labours of Messrs. Joseph and Francis Keller, engineers in the service of the Government of Brazil. These obstructions, extending for nearly 230 miles along the course of this river, have hitherto operated as a check to intercourse along this grand stream, which would otherwise form the main artery of communication between the Atlantic coast and Bolivia by way of the Amazons. The importance of this river to the rich territory of the Bolivian Republic will be readily comprehended when it is considered that, unlike Peru, the great bulk of the population is located in the interior of the country, on the head-waters of the streams which flow on the one hand towards the Amazons, and on the other towards the Plata, and is separated from the Pacific coasts by a broad tract of desert and mountains. Water-communication by way of the Amazons with the Atlantic, and with Europe, has become a necessity to the development of the

resources of the country. The Bolivian Government have, therefore, in co-operation with that of Brazil, whose western provinces would also be greatly benefited by the opening of the Madeira, decided on making a vigorous attempt to overcome these obstacles, and have conceded to a Company organized by one of our associates, Colonel G. E. Church, the right and privileges of constructing a railway which shall connect the lower course of the river with the long stretch of navigable stream above the rapids, and which will thus remove the only obstacle to the utilization of a natural commercial route nearly 3000 miles in length, from the mouth of the Amazons to the upper waters of the tributaries of the Madeira at the eastern foot of the Andes. According to a statement published by Colonel Church, the successful carrying out of this scheme would bring two millions of people—that is, four-fifths of the entire population of the Amazon basin, with all the vegetable and mineral wealth of their country—within easy reach of Europe, from which they are at present separated by the Andes and by the circumnavigation of Cape Horn. To us, as Geographers, this project is one of great interest, not only from the direct contribution to our knowledge which the surveys connected with the railway are sure to afford, but from the prospect held out of the exploration of the Beni and other little-known tributaries which flow through this region from the Andean region of South Peru and Northern Bolivia. It is gratifying to learn that the first two steamers, carrying the staff of engineers and mechanics, and a large portion of the material, left England in April last for the Madeira, *viâ* Pará and the Amazons.

We are indebted to our Medallist, Mr. William Chandless, for a document of considerable value and utility to travellers in this part of South America, as well as to Geographers. This is a "List of Geographical Positions in the Valley of the Amazons," compiled by Mr. J. H. Rochelle, of the Peruvian Hydrographic Commission. It gives the exact position of a large number of places, from observations taken chiefly by officers in the Peruvian service and not yet published, at least in an accessible form. It will be published in the "Additional Notices" in the current number of our 'Proceedings.'

Mr. C. B. Brown, of the Geological Survey of British Guiana, whose paper on his discovery of the magnificent waterfall of Kaieteur, in the interior of that colony, attracted considerable attention last Session, has since then continued his exploration with good results, and is now returned for a short period of repose to England. The greater part of the wild region traversed by Mr.

Brown is known to us by the explorations of Sir Robert Schomburgk, but many important parts were left untouched by that distinguished traveller which Mr. Brown has been able to examine. For example, the head-waters of the Corentyn and Essequibo rivers, and the line of watershed lying east and west which separates the Guiana drainage from that of the Amazons. Mr. Brown devoted seven months to this exploration, from September, 1871, to March, 1872. Ascending the Corentyn to the southern frontier of the colony, he followed the boundary line over the American mountains to the Essequibo, returned thence again to the Corentyn, and descended the river to the sea. He afterwards ascended the Berbice River nearly to its source, and crossed from there to the upper waters of the Demerara. The most important result of these explorations is the ascertained low altitude of the watershed. In the place where on our best maps we find a formidable-looking mountain range under the names of Sierra Acarai and Sierra Tumuraque, Mr. Brown walked with his party of six men over an undulating country, elevated only 600 to 700 feet above the sea-level, and met with no other obstacle than dense forest and swampy ground. The highest hill observed was only 1240 feet above the sea; this he ascended, and obtained from its summit an extensive view over the hilly country to the south. He fully satisfied himself that there was no definite range along the line of watershed.

ARCTIC EXPLORATION.—During last summer the reconnaissance of the sea between Spitzbergen and Novaya Zemlya, by Lieutenants Payer and Weyprecht, which Sir Roderick Murchison referred to in his last Address, was accomplished, under the auspices of the Austrian Government. The object of these enterprising explorers was to follow the supposed Gulf-stream into the Polar Basin, by keeping nearer the coast of Novaya Zemlya than had been done in the attempt of Koldewey in 1868. They sailed from Tromsö, in Norway, on the 21st of June, 1871, in a small vessel of 70 tons, with a crew, all included, of eight souls. Having failed in an attempt to approach Gillis Land by way of Stor Fiord, they tried another route by following the eastern coast of the outermost islands of the Spitzbergen group, and on the 29th of August they had reached 77° 30′ N., on the meridian of 42° E., where the vicinity of land was indicated by the decreasing depth of the sea and the numerous bear-tracks on the ice; but thick fogs appear to have

constantly obscured their view. Hitherto they had been beating about in navigable ice; but on the night of the 30th, in latitude 78° N., they struck upon the ice-edge, on the meridian of 41° 30′ E. In the evening of the 31st they were in latitude 78° 41′ N., amongst ice which seemed to be moving to the north-east. Here their progress was stopped by thick fog and a stiff contrary wind; and many signs, such as fresh mud and sea-weed, led them to infer the near neighbourhood of land. These observations seem to lead to the conclusion that the land, called Gillis, or King Charles Land, to the eastward of the Spitzbergen group, is of considerable extent.

Having thus reached their most northern point, the explorers then stood towards the coast of Novaya Zemlya, and on the 6th of September, in latitude 78° 5′ N. on the 56th meridian, they met ice, with a heavy sea beating upon it. Thence they struggled homeward, against continual storms from the south-west, and anchored in Tromsö again on the 4th of October.

During the same summer Mr. Smith, an English yachtsman, attained an unusually high latitude, within a few miles of that of Scoresby, by sailing up the western side of Spitzbergen.

Lieutenant Payer, encouraged by the comparative success of his summer cruise, is fitting out a second Austrian expedition on a more efficient scale, with the intention of rounding the northern point of Novaya Zemlya, and making his way along the coast of Siberia. It is not at all impossible that, by dint of perseverance and good fortune, this gallant officer may meet with that measure of success which his undaunted efforts so well merit; and all English geographers will wish his expedition a hearty God-speed.

A very remarkable voyage was also made, in the summer and autumn of 1871, by a Norwegian captain, named Elling Carlsen, who succeeded in circumnavigating Novaya Zemlya. He sailed from Hammerfest on the 16th of May, in a sloop of 60 tons, with a crew of 11 men, and made his way up the western side of Novaya Zemlya until he reached the north-eastern extreme of that extensive group. He anchored in Ice-haven on the 7th of September, and discovered a house built of ship's timbers, standing at the head of the bay, about 100 yards from the water. It was 32 feet long by 20 broad, and several large puncheons were standing round it, which fell to pieces when Captain Carlsen attempted to remove them. This strange old building turned out to be the house erected by that famous Dutch navigator Barrents and his shipwrecked crew, well-nigh three centuries ago. The number of curious articles it con-

tained, proved, beyond any doubt, that the place had not been visited since Barrents and his men left it in two open boats on the 14th of June, 1596. The brave old commander died in his boat on the 19th, and, like La Peyrouse and Franklin, he found a grave in the midst of his discoveries; but 12 survivors, including Gerrit de Veer, the second mate and historian of the expedition, lived to return to Holland and to tell their story to the Prince of Orange and the Danish Ambassador, after a grand dinner. The Norwegian captain must have entered the strange house, which had stood for 276 years in profound solitude, with feelings of intense curiosity and interest; and he discovered and brought home a number of precious relics. Mr. Lister Kay, a young English gentleman, who was at Hammerfest, on his way to Lapland, when Captain Carlsen returned, purchased the collection, in the belief that his Government would be eager to acquire it. This, however, proved not to be the case; but the Netherlands Government have since purchased the collection from Mr. Lister Kay, and the relics will find a suitable resting-place in the native land of William Barrents. Among them are copper cooking-utensils; gun-barrels, one of them square externally; carpenter's tools; a clock; spoons; a tankard; fragments of engravings; three books in Dutch, one on navigation, another a history of China, and a third a history of the world; candlesticks; a sword; a halberd-head; and a pitcher of Etruscan shape, beautifully chased. It is seldom that so interesting a recovery of relics has been effected, and the high reputation of the ancient Dutch navigator enhances the interest which attaches to them. The voyage of Barrents has been published by the Hakluyt Society, and many of the relics brought home by Mr. Lister Kay will actually be found represented in the curious illustrations of Gerrit de Veer.

Barrents reached Ice-haven on the 26th of August, and "here they were forced, in great cold, poverty, misery, and grief, to stay all the winter." Carlsen narrowly escaped a similar fate, as he slowly made his way down the eastern side of Novaya Zemlya. Once a gale from the south-west drove him back into the Ice-haven of Barrents, and for several days he was much impeded by the ice. On the 21st of September he was beset, and, as it was freezing hard, he made preparations to abandon the ship; but, providentially, he got into some open water on the 30th. On the 6th of October he passed through the Waigat Strait, and reached Hammerfest on November 4th, 1871, having accomplished the most remarkable

voyage in that direction since the time of Barrents. In 1595 south-westerly gales drove the ice off the shore, towards the end of September; and Carlsen mentions exactly the same thing as having happened in September, 1871. Other observations of the old Dutch navigators are confirmed by the experiences of our Norwegian captain; but Carlsen's chart shortens the distance between Cape Nassau and Ice-haven, and thus considerably alters the shape of north-eastern Novaya Zemlya. We may expect further light to be thrown on the geography of this region by the researches of Lieut. Payer during the present year.

I am also able to announce that Sweden is preparing a new Polar expedition, which will sail from Gothenburg this summer, and has been fitted out through the noble liberality of the inhabitants of that town. The veteran Arctic explorer, Professor Nordenskiold, will be at the head of the expedition, which consists of two vessels, supplied by the Swedish Government—the steamer *Polhem*, and a brig, called the *Gladan*. The brig will return in the autumn, but the steamer will be away until the autumn of 1873, and she takes out a wooden house, consisting of seven rooms and a kitchen, and reindeer for the sledges. During the autumn the intention is to explore the land to the eastward of Spitzbergen, which has so often been sighted, but never landed upon; and in the winter of 1872-73, with the help of reindeer, they will make a bold attempt to reach the North Pole, by travelling over the ice. Professor Nordenskiold is a veteran, for this is his sixth Arctic voyage; and he has proved himself to be an able and resolute explorer. His companions have been carefully selected, so that very important results may be confidently anticipated from the labours of these hardy Northmen. The old heroic literature of Scandinavia is closely connected with Arctic research; and we cannot fail to rejoice at the place which the descendants of Other and of Eirec Raude are so worthily taking among the explorers of the North Polar regions.

But England should do something more than look on and applaud, while others work. The numerous Arctic expeditions and cruises undertaken by Swedes, Norwegians, North Germans, Austrians, and Americans during the last seven years, have kept the attention of geographers steadily turned to the problems which remain to be solved within the unknown region surrounding the Northern Pole. The results of these efforts have all tended to confirm previous experience, and thus to secure that amount of unanimity with regard to the method of solving those interesting problems, which

was necessary before the exploration of the North Polar region could again be advocated in England, with any prospect of success. In the opinion of Arctic officers, and of others best able to form a correct judgment, the time for urging a renewal of these enterprises, which form so proud a page in our history, has now arrived; and when Captain Sherard Osborn addressed a meeting of our Society on this subject, on the 22nd of April, his views were warmly supported, not only by the leading naval officers of Arctic experience, but also by men of science, such as Dr. Hooker and Dr. Carpenter, who know well the vast importance of the results to be achieved by Arctic exploration.

The Council have, therefore, adopted a Report on this subject, which has been drawn up by an Arctic Committee; and they feel that the opinion unanimously expressed by the highest authorities on such a question must carry great weight. The conclusions of the Council are based on the following considerations. The unknown region covers an area of more than a million square miles. It is obvious that a single expedition cannot undertake to explore this space. It is therefore necessary to select that portion of it for exploration which offers the three advantages that are considered essential. These are:—1st. The greatest certainty of exploring a previously unknown area of considerable extent. 2nd. The prospect of the most valuable discoveries in various branches of science. 3rd. The best security for a safe return. These advantages can only be secured in that portion where a coast-line of great extent is known to exist, because the most valuable discoveries must be made on or near the land.

The unknown coast of Greenland intervenes between a point in about 82° N. lat. on the west side, and a point in 77° N. lat. on the east side; and at both points, which are 600 miles apart, the land trends north. There is no other land offering similar conditions on the verge of the unknown area. The object of an English Arctic Expedition should, therefore, be to explore the unknown shores to the north of Greenland; and in order to reach the point whence discovery would commence, such an expedition must proceed up the west coast of Greenland, in Baffin's Bay and Smith's Sound. This route is preferable to one by the east coast of Greenland, because of the facilities for retreat to the Danish settlements.

Such an expedition should consist of two screw steamers, one to be stationed within the entrance of Smith's Sound, the other to advance as far as possible to the northward (preserving communi-

cation with the depôt vessel), from which point sledge-parties would start in the early spring, and explore the unknown region in various directions. The advanced parties would be in such a position as to be able to fall back upon the consort at her station within the entrance of Smith's Sound. Thence, in the event of an improbable accident, the whole expedition could retreat, without difficulty, to the nearest Danish settlement in Greenland, as has before been done. Thus two advantages—the certainty of discovering a wide extent of coast-line, and the security for a safe return—are ensured by adopting this course. They could not be secured by taking any other route.

The discovery of the northern side of Greenland also offers the second advantage—the prospect of securing the most valuable results in the various branches of scientific research. A geographical problem of great importance and interest will be solved by completing the circuit of Greenland, ascertaining the extent and nature of its northern shores, and discovering the conditions of land and sea in that portion of the unknown area. An Arctic Expedition, as a supplement to the expedition now preparing to investigate the ocean-bottom in the middle and southern latitudes of the globe, is a scientific necessity; and Dr. Carpenter considers that there is no better sphere for its labours than the northern Greenland seas. In botany, in zoology, in ethnology, and in geology, there are discoveries of the first importance to be made in the unknown region, some of which were enumerated by Dr. Hooker in his remarkable address at our meeting on April 22nd; and valuable contributions will also be made to geology and meteorology. It should also be remembered that the exploration of an unknown region, will necessarily bring to light a number of important facts in every branch of science, which cannot possibly be foreseen.

In addition to the harvest of results with which Arctic discovery will enrich science, there are other considerations to which great weight must be attached. Another generation of naval officers will be trained in ice-navigation, a much-needed field will be opened for individual enterprise, opportunities will be offered for distinction, and a great benefit will thus be conferred upon the navy, and, through the navy, on the country generally.

AFRICA.—*Sir Samuel Baker.*—An interesting letter which was addressed to the Prince of Wales by Sir Samuel Baker during the autumn, and which, by His Royal Highness's order, was communi-

cated to our Society, has supplied us with full information as to the progress of the Upper Nile Expedition as late as the 22nd of last October. At that date our valued correspondent, in whose welfare we are so greatly interested, after overcoming the most extraordinary difficulties in cutting a way for his vessels through the forest of reeds which now fill the bed of the Bahr-el-Giraffe, had succeeded in reaching a point 20 miles in advance of Gondokoro. His force had become a good deal disorganized owing to a shortness of supplies and a pestilential climate, added to the hardships to which they were exposed in dragging the flotilla through the shallows and marshes of the Bahr-el-Giraffe; but since they had again reached the navigable bed of the Nile and were quartered in the fertile country of the Báris, the men seem to have pretty well recovered their health and discipline, and the prospects of the expedition had assumed a more favourable appearance. The Khedivé, too, as I am informed by travellers who have lately returned from Egypt, and on whose statements I can depend, has not by any means lost his interest in the success of the expedition. Faithful to the promises which he made to H.R.H. the Prince of Wales, he is making every effort to support Sir S. Baker, and has thus organized a recruiting depôt at Khartoom for the purpose of supplying soldiers of the country, thoroughly acclimatized, to repair the losses that have been sustained, and restore the expedition to its former state of efficiency. It is hoped and expected that when Sir S. Baker receives these reinforcements he will be able completely to overawe the rebellious Báris, and will then push on for the Albert Nyanza, in order to launch his steamers on this great inland sea and explore its southern extremity. In the mean time, however, the communication between Khartoom and Gondokoro seems to be interrupted, and Sir S. Baker has warned us that he will not be able to send further despatches to Lower Egypt till near the close of the year. I may add that the Upper Nile is likely ere long to be brought into the general round of Oriental travel, as a Railway is being now laid down by English Engineers along the river to Khartoom, which when completed—and the Khedivé is pushing it forward with the greatest activity—will render Nubia as accessible to tourists as Egypt has hitherto been.*

* The important additions to our knowledge of the region west of the Upper White Nile, made by Dr. Schweinfurth, were noticed in the last year's Address, but I think it necessary to call attention here to the testimony borne by this traveller to the value of Mr. Petherick's observations in his journey of 1862 *viâ* Neangara; the astronomical positions fixed by our English traveller having served

Lake Region and South-Eastern Africa.—In the mean time the Geography of the Equatorial Lakes has received some valuable illustration from the investigations of Captain Burton and Mr. Keith Johnston, who have sifted the evidence on which the Victoria Nyanza retains its position in the Map of Africa as a single and undivided body of water; and have certainly succeeded—by means of the native routes collected by Mr. Wakefield, and published in our last 'Journal'—in throwing considerable doubts on this received delineation, which nevertheless is maintained with unflinching faith by Colonel Grant, the only living European traveller who has ever seen the waters of the Lake.

And here I cannot help again drawing attention to the signal service rendered to the cause of African Geography by Mr. Keith Johnston, who, in a brief but pregnant pamphlet, entitled 'A Map of the Lake Region of Eastern Africa,' and published in 1870, brought together all the information regarding the interior of the continent and the various water-systems which it embraces, that could be gathered from the little-known travels of Lacerda, the Pombeiros, Graça, Ladislaus Magyar, Silva Porto, Piaggia, and the Poncets, as compared with the discoveries of our own explorers, Livingstone, Burton, Speke and Grant, and Baker, and with the route-tracks and researches of the German travellers, Roscher, Krapf and Rebmann, Von der Decken, Brenner, Schweinfurth, and Mauch. To the last-named gentlemen the Council, as you have been already informed, have awarded an honorarium of 25*l.* for his successful exploration of South-Eastern Africa, where, between the Limpopo and Zambesi, he has discovered the ruins of an extensive city, which, without adopting the fantastic notion of an identification with the Biblical Ophir, we must at any rate admit to indicate a degree of populousness and civilization far superior to anything known in the modern history of the region.

The successful ascent of Kilima Njaro by the Rev. Charles New, in the course of last autumn, and his discovery of the Lake Chala at the north-eastern foot of the mountain, require also to be briefly noticed. Mr. New is the first traveller who has actually reached the snow-limit on this culminating point of the African Alps, and he is the first who has brought back any specimens of the flora of this interesting region. His letter describing and classifying seven dis-

Dr. Schweinfurth as landmarks, and thus enabled him to furnish materials for an outline map of the country.—See Petermann's 'Geographische Mittheilungen,' 1871, p. 133.

tinct zones, according to altitude, physical character, and vegetable products, as he ascended from the tropical district of Chagga, with its plantations of banana, plantain, and maize, to the region of eternal snow at the summit of the mountain, was listened to with great interest and attention at one of our recent evening meetings; and we may hope that he will some day favour us, *viva voce*, with a more detailed account of his journey from Ribe to Teita and Chagga. At present it is understood that Mr. New, whose African experience and acquaintance with the dialects, render him a most valuable auxiliary, has joined the Livingstone party at Zanzibar, the requisite permission to this effect having been obtained from the United Methodist Free Church Missionary Society (to which establishment Mr. New belongs) by the Livingstone Committee when they were organizing Lieutenant Dawson's Expedition at the beginning of the year.

Nor must I omit to bear witness in this brief notice of African discovery, to the great value of Captain Elton's exploration of the Limpopo. Constructing a boat at the Tati settlement, and carrying it overland some 250 miles, Captain Elton launched it on the Limpopo at the junction of the Shasha stream. From thence he descended about 400 miles by the river to the junction of the Lipalule, and thus connected his exploration with the work of Mr. St. Vincent Erskine, who had already traced the Limpopo from this point to the sea, proving it to be the river laid down in Captain Owen's chart as the Inhampura. From the affluence of the Lipalule, where Captain Elton quitted the Limpopo, he struck across a rarely visited country, to the Portuguese settlement of Lorenço Marques in Delagoa Bay, thus completing a journey of nearly 1000 miles in fifty-two marching days.

Old Calabar.—Turning to the Western Coast of Africa, the only exploration of importance which has been brought to our notice during the year is that of the Old Calabar and Cross rivers, east of the mouths of the Niger, by our enterprising and intelligent associate, Captain J. B. Walker. Captain Walker, who resides on this part of the West African Coast, employs himself during his journeys in the interior in surveying the courses of the numerous streams, and in investigating the productions of the country. A descriptive paper from his pen is published in No. 2 of vol. xvi. of our 'Proceedings;' but his charts, executed on a large scale, have been transferred to the Hydrographic Department of the Admiralty and incorporated on a reduced scale, in the new issue of the official chart of that part

of the coast. Since then we have been informed by Captain Walker that he has mapped the middle and western branches of the Cross and Old Calabar rivers, which had never before been explored by a European, and he promises to send his charts for the use of the Society. Missionaries belonging to the United Presbyterian Church have been established in this remote part of the West African Coast for the past twenty-five years, but the almost insuperable difficulty of penetrating more than a few miles beyond the narrow bounds of the mission stations, has hitherto prevented them from adding much to our knowledge of the country. The more welcome, therefore, is an account of the geography and tribes, by Dr. Robb, the first part of which has been recently published in the 'Missionary Record' for March, 1872, and which gives a clear idea of the ethnology of the region. The views of the founders of this mission, we are informed, were to aid in opening the way to the populous and salubrious districts in the vicinity of the Niger and the Tchadda; but after twenty-five years of efforts, it is confessed that the missionaries remain as ignorant of the region stretching between those two great rivers, and the mountains, visible in clear weather from the most inland stations, as they were a quarter of a century ago. The enterprises of the Rev. Dr. Robb seem, however, to have met with a certain amount of success, and there appears to be now some chance of opening up a route to Central Africa, by way of Old Calabar and the Efik territory, instead of by the pestiferous Delta of the Niger; though if it be true that the Doctor has been compelled, as reported, by the state of his health to leave the country for a time and seek the invigorating English climate, some delay may take place before this great object can be effected.

DR. LIVINGSTONE.—I have reserved for the concluding portion of my Address a narrative of our proceedings in regard to Livingstone. When Sir Roderick Murchison, in May of last year, composed his farewell Anniversary Address to you, it was merely known that Dr. Livingstone, late in the year 1869, had crossed Tanganyika Lake from Ujiji, and had gone to the so-called cannibal country of Manyema, for the purpose of ascertaining the direction and ultimate distribution of the waters which he had been tracing up from their source in about 12° of south latitude. There were reports, however, which had come to Zanzibar from Unyanyembe, that, in the spring of 1870, Livingstone had returned, or was about to return, from Manyema to Ujiji, to which latter place

Mr. Churchill and Dr. Kirk had, in the mean time, succeeded in sending a considerable amount of stores and supplies, under directions from, and at the expense of, the Foreign Office. In allusion to these reports, Sir Roderick congratulated the Society, at the Meeting referred to, on the possibility of Livingstone's return to England within the year; but, at the same time, he warned us against being too sanguine, repeating his own belief that the great traveller would not turn his steps homeward until "he had solved the problem of the true watershed of Southern Africa."

When, a few months afterwards (November 18th, 1871), I delivered my brief Address to you at the opening of the present Session, we were without any further direct accounts of Livingstone's movements; but I had learnt in the mean time that an American gentleman, of the name of Stanley, had passed up from the coast at Bagamoyo into the interior, with a view of communicating with, and, if necessary, relieving, the great English traveller. There was a certain vagueness at the outset about Mr. Stanley's object and resources which was exceedingly puzzling. I ventured myself to put the most natural "English" construction on his movements, and suggested accordingly that "he was actuated by a mere spirit of adventure and discovery." Somewhat later I ascertained that he was not a simple tourist, nor even an explorer, in the usual sense of the term, but that he had been sent out by our Transatlantic cousins, among whom the science of advertising has reached a far higher stage of development than in this benighted country, for the purpose of "interviewing" Livingstone, and communicating intelligence of his whereabouts to the 'New York Herald,' one of the most energetic, as it is the most popular, of the American newspapers. It is highly complimentary, I think, to our geographical reputation, while, at the same time, it bears testimony to the extraordinary spirit of enterprise which animates the leaders of the American press, and to the magnitude and importance of the interests they control, that the proprietors of a New York newspaper should thus send out an experienced Commissioner, with a carte-blanche as to expense, to lead an expedition into Central Africa, in order to gain information regarding Livingstone for the edification of the American public. It is, at the same time, no disparagement to Mr. Stanley's personal activity and energy, nor to his singular aptitude for African travel, that his mission should thus prove to have been of a practical and utilitarian character, instead of being conducted for

scientific objects, or in a mere spirit of purposeless adventure, as I had at first supposed.

So long as all went well with Mr. Stanley—and for some time all did go well—we were content to await the results of his adventurous journey. He reached Unyanyembe, half-way between Zanzibar and Tanganyika, about this time last year, and was pushing on for Ujiji, when local troubles intervened. Unyanyembe is inhabited by an Arab colony, who, in the interests of the ivory-trade, keep up the communication between the sea-coast and the interior: but these Arabs, who are overbearing and high-handed, often fall out with the natives of the neighbourhood; and, on this occasion, a serious conflict occurred between the two parties just at the period of Mr. Stanley's passage. Unfortunately, too, the men composing his escort were drawn into the quarrel. Four of them were killed: his own baggage and supplies were plundered, and his further progress seemed to be indefinitely arrested. When this crushing intelligence reached England in December last, not only compelling us to abandon any immediate prospect of communicating with Livingstone, but also threatening us with a loss of the supplementary supplies that were *en route* for Ujiji at the time of the outbreak, it appeared to us of the first necessity that active measures should be adopted to repair the disaster. Forming ourselves accordingly, into a Livingstone Committee, we entered at once into correspondence with Her Majesty's Treasury and the Foreign Office, with a view to the organization of a fresh expedition, which should penetrate with stores into the interior of the country, and thus afford relief to Livingstone in the event of the Ujiji supplies being exhausted, and those which were sent up afterwards by Dr. Kirk being plundered or destroyed in transit. Our application to the Government was not altogether ineffectual; for although the Treasury declined any direct pecuniary aid, on the ground, as afterwards explained in Parliament, that national interests were not concerned in the movement, the Foreign Office, on the other hand, entered warmly into our views, placing at our disposal the balance of the old grant, amounting to about 600*l*., which remained in the hands of Dr. Kirk, and furnishing us with recommendations and credentials of the most satisfactory character. We now came forward and addressed the country. The objects of the expedition, which were principally (but not exclusively, for we also contemplated the extension of geographical knowledge) to afford effectual relief to Livingstone, were duly explained by advertisement in the daily papers.

Public meetings were held in London, Glasgow, Edinburgh, and other cities. I had the honour of frequently consulting the Fellows at our evening meetings as to the arrangements in progress, and the best method of giving effect to their wishes, eliciting on all such occasions marks of your unqualified approbation of our proceedings, and of your cordial interest in the success of the project. It soon, indeed, became apparent that the Livingstone Search and Relief Expedition would not languish for want of support. Subscriptions came pouring in from all quarters. The Royal Geographical Society headed the list with a contribution of 500*l.*; Glasgow followed with 1000*l.*; Edinburgh has since sent us 700*l.*, and the small town of Hamilton, the dwelling-place of the Livingstone family, has even presented us with 200*l.* The City of London, too, has given us a hundred guineas; and contributions of a nearly equal amount have come in from well-wishers in Sweden, in Italy, in Egypt, and in India.* In all quarters, indeed, we have met with the most generous sympathy, and the result has been that our Subscription List now shows an aggregate of over 5000*l.*, exclusive of the Government balance at Zanzibar.

As soon as we had sufficiently felt our way and found that we might rely on public support, we accepted, out of a host of volunteer offers, the tender of the services of two young and accomplished officers of the Royal Navy, Lieuts. Llewellyn Dawson and Henn—with whom Mr. Oswald Livingstone, a son of the traveller, was afterwards associated in a quasi-medical capacity—and we proceeded at once to equip the expedition and furnish it with full instructions. Fortunately at this juncture the first steamer which ever made the direct voyage from London to Zanzibar, through the Suez Canal, was about to leave the docks. The proprietors offered us accommodation on very favourable terms, and the Admiralty having in the mean time supplied us with a full equipment of arms, the whole party accordingly embarked for its destination on February 9, 1872, within two months of the time when the idea of sending forth such

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* The following donations merit special acknowledgment:

	£		£
Sir T. Fowell Buxton	200	African Association	105
The Duke of Sutherland	100	Henry Hoare, Esq.	100
His Excellency Count Platen, of Sweden	100	Mr. Cowasji Jehúngír Ready-money	100
J. Young, Esq.	100	J. N. Mappin, of Sheffield	100
Colonel Grant	100	Court of Common Council of the City of London	105
Baroness Burdett Coutts	100		

an expedition, in consequence of Mr. Stanley's reported failure, was first originated.

The *Abydos*, as the steamer was named, probably reached Zanzibar about the middle of March, and she left again on her return voyage on the 22nd of April.

During the Easter recess I received letters from Dr. Kirk announcing that the news of the intended expedition, which had been sent by telegraph to Aden, had reached him in very good time, and that he was diligently preparing for its reception. He had no definite intelligence either of Livingstone or Mr. Stanley, but believed that the former was still at Manyema, and that the latter had gone to Ujiji. The disturbances, however, at Unyanyembe continued, and the communication with the interior on the main line was therefore still interrupted, though travellers came in from the north and south of the lake, and a Mission from the King of Uganda (on the Lake Victoria of Speke) to the Sultan of Zanzibar was at that time actually residing on the island. It will depend greatly, of course, on the relations between the Arabs and the natives, and the consequent security or insecurity of the roads, whether Lieut. Dawson will seek to penetrate to Ujiji by the route of Unyanyembe, or whether he will prefer taking the northern line along which the Uganda Mission travelled to the sea-coast. This northern line, which debouches sometimes on Mombass and sometimes on Zanzibar, is becoming, according to Dr. Kirk's reports, a regular trade-route between Upper Egypt and the African seaboard, and will thus facilitate, in no small degree, the solution of those problems which still remain unsettled, and which were ably discussed by Captain Burton at one of our recent meetings as to the southern configuration of Lake Victoria, and its possible division into three, or more, distinct bodies of water.

A telegram reached England early in the month to the effect that the *Abydos* which left Zanzibar to return home on the 22nd of April, and arrived at Aden on May 1st, had brought intelligence of the meeting of Livingstone and Stanley at Ujiji. This meeting is nothing more than might have been expected from our previous information of the movements of the two travellers. If Dr. Livingstone, indeed, had received at Manyema the supplies which had been sent on by Sherif Basheikh from Ujiji at the end of 1870, he might very well have concluded his investigations of the Cazembé waters during the course of last year, and have thus returned to the west side of Lake Tanganyika by February last; while if Mr. Stanley, on recovering

from his fever, had been able, notwithstanding the loss of his supplies, to push on from Unyanyembe, he would also have reached the same locality at about the same period of time; and it would have been very gratifying to Livingstone, who in all probability had abundant stores at Ujiji, to have been thus able to relieve the wants of the distressed but still persevering American traveller. For full information on this subject, however, as well as for an announcement of the plans of Lieut. Dawson's Expedition, we must await the arrival of the Zanzibar letters brought by the *Abydos* to Aden, and now on their way to England. In the mean time I can only repeat, that although the recent meeting of Livingstone and Stanley at Ujiji at present rests upon mere native rumour, yet it is so very probable a result of the arrangements known to be in progress, that it certainly merits attention.

In the absence of any direct intelligence from Livingstone, we are obliged to have recourse to conjectures, which will be received with more or less confidence, according to the temper, and perhaps the wishes, of those who are addressed. I find from a route, which was communicated to us by Dr. Kirk in his last despatches, that Manyema is much further from Lake Tanganyika than I had before suspected. According to this route, which mentions eleven large stations, each separated by considerable intervals, between Marúngo, at the southern extremity of the lake, and Manyema, the distance cannot be less than 200 or 300 miles, and I can well understand, therefore, that Livingstone, in his present crippled and infirm condition, may have long hesitated to undertake so formidable a journey on foot—the reason, or one of the reasons, of his protracted sojourn at Manyema being thus perhaps explained. That he really is in a crippled condition, and unable to tramp over Africa as he used, unwearied in body, unbroken in mind, hardly admits now of any doubt. His accident with a buffalo was reported to Mr. Stanley many months ago by two informants, and the story is now confirmed by the merchants who have lately seen him at Ujiji. A man with one arm and one leg, however determined in character or vigorous in his general constitution, cannot further endure the fatigue of African travel; and if Livingstone, therefore, as I believe to be the case, has now returned to Ujiji, it is probably with the view of turning his steps homeward, and abandoning to younger explorers the supplemental solution of the great problem of the African watershed. That that solution, then, may fall to the lot of our present Expedition, animated by the spirit and informed by the experience

of Livingstone, I fervently hope, feeling assured that Livingstone himself will cordially cast his mantle on their shoulders, and rejoice with honest pride in their success.

Postscript.—Since reading my Address at the Anniversary Meeting, I have been favoured by Earl Granville with copies of official despatches, written by Dr. Kirk to the Foreign Office, under date of 10th April, in which, speaking of the letters received from the Arab traders of Unyanyembe, which had been placed in his hands by the Sultan of Zanzibar, he gives the following important details respecting the rumour of the meeting of Dr. Livingstone and Mr. Stanley at Ujiji:—

"In no letter to which I have had access is mention made either of Dr. Livingstone or Mr. Stanley, nor, so far as I have been able to learn, have any letters been received in transit for New York from the latter. I have myself closely examined the slaves from Unyanyembe as to Mr. Stanley's movements, and learn that, having fallen back with the Arabs on the station, on the day of their defeat by Mirambo, Mr. Stanley, shortly after, set off in company with a party proceeding to Ujiji by a roundabout way, skirting the disturbed districts; his second white man (mate of an American ship, the *Nevada*, who joined him here) was sent back to Unyanyembe, where he died. So far the native account of what fell under their own observation may be relied on, but great doubt attaches to the further hearsay statements that I now relate.

"These slaves, examined separately, state that before leaving Unyanyembe, Saeed bin Majid, an Arab of Ujiji, whose name I have before mentioned, fought his way past Mirambo and entered the settlement, having lost five of his men in an encounter. He brought with him neither ivory nor goods, and had left all but his fighting men at Ujiji; he is said to have reported that, before he left, Dr. Livingstone had returned to Ujiji and been joined by Mr. Stanley. It is also said that Mohammid bin Gharib had returned, and three others who had gone on the Manyema track.

"I unwillingly mention such reports, being at the same time wholly unable to vouch for their veracity. Mr. New, myself, and some Arab chiefs have tried our best to sift them, but without success: they may be pure inventions or prove true statements; the Arabs seem inclined to credit them, while white men, on the whole,

doubt their accuracy. Of one thing I am, however, convinced, that the suspicion entertained by people at home, of news being in possession of the Arabs of some misfortune having befallen Dr. Livingstone, which they conceal in order to profit by goods sent to his relief, is wholly groundless and false.

"I have addressed the chief men of Unyanyembe by the slaves now on their return, and who will reach within thirty days, complaining of their having given no intelligence, and urging them to write at once and send on any letters they have in hand from Ujiji relating to the Doctor."

P.P.S. Whilst these sheets are passing through the press, further authentic intelligence of the movements both of Stanley and Livingstone has reached us by telegraph from Aden, as well as from Bombay. It seems that Livingstone, in the course of last autumn, must have followed up the western drainage from Manyema to the north end of Tanganyika, and that he found all the rivers flowing *into* the Lake, apparently by the Rusizi Channel—the possible connection of this Lake and its affluents with the Nile, which has been a favourite hypothesis with recent inquirers, being thus finally disposed of. From the north end of the Lake, Livingstone proceeded to Ujiji, where, as already conjectured, he met with Stanley and took possession of the residue of the supplies. After this meeting, which must have been full of interest, the two travellers journeyed together from Ujiji to Unyanyembe, and Stanley, continuing his route, pushed on to Zanzibar, where he had arrived with letters from Livingstone before the departure of H.M.S. *Wolverine*, which reached Aden on the 13th of June. But the great traveller himself, indomitable as ever, and caring little for personal comfort or convenience, is said to have been disinclined to leave the country until he had completed his explorations. He was preparing accordingly, as soon as the arrival of further supplies from Zanzibar had placed him in a position of independence, to turn his steps from Unyanyembe to the southward: primarily, it is said, for the purpose of examining a subterranean passage of great local celebrity, and the reports of which had strongly arrested his attention in a previous journey, but also, it may be surmised, with the more important object in view of ascertaining whether there is any outflow in this direction from Lake Tanganyika to the sea, as laid

down on the old maps of Mr. McQueen and others, on the authority of the Portuguese and Arab travellers.* Dr. Kirk had crossed over to Bagamoyo to forward-on the supplies to Unyanyembe, and Mr. Oswell Livingstone intended to accompany the caravan, and thus join his father in his future wanderings. We are not yet officially informed of the proposed movements of Lieutenants Dawson and Henn; but it is probable—as the immediate objects of their expedition, which were the discovery and relief of Livingstone, have been accomplished—that they will return to England.

* In Captain Owen's Admiralty Chart of 1824 the delta of the River Lufiji is laid down from 7° 45′ to 8° 15′ south latitude; and the river is said to come from a lake (Tanganyika?), forty days' journey to the west.

June 14, 1872.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED DECEMBER 28TH, 1872.]

SESSION 1871-72.

Thirteenth Meeting, 10th June, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*William Hunter Baillie, Esq.; George Thomas Clark, Esq.; Joseph Clarke, Esq.; Charles Edward Hubert, Esq.; Rev. S. A. Pears*, D.D. (Head Master of Repton School); *Robert Watson, Esq.*

ACCESSIONS TO THE LIBRARY FROM MAY 27TH TO JUNE 8TH.—'The Annals of Rural Bengal.' By W. W. Hunter. 1871. 'Orissa.' By W. W. Hunter. 1872. Purchased. 'The Himalayan Districts of Kooloo, Lahoul, and Spiti.' By Capt. A. F. P. Harcourt, F.R.G.S. 1871. Donor the author. 'The Discovery, Survey, and Settlement of Port Phillip.' By G. W. Rusden. 1872. Donor the author. 'The Great Lone Land; a Narrative of Travel and Adventure in the North-West of America.' By W. F. Butler, F.R.G.S. 1872. Donor the author. 'Schweizerische Polytechnische Zeitschrift.' Von Dr. P. Bolley und J. H. Kronauer. Donor Dr. J. M. Zeigler, Hon. Corr. F.R.G.S.

ACCESSIONS TO MAP-ROOM, SINCE THE MEETING OF MAY 13TH.—Map of the Northern part of Abyssinia, showing the tracks of W. Munzinger. Karte der Zillerthaler Alpen. By Carl von Sonklar. Presented by Dr. A. Petermann, Hon. Corr. F.R.G.S.

DR. LIVINGSTONE.

THE PRESIDENT said he was happy to be in a position to inform the meeting, that all doubt as to the safety of Dr. Livingstone was now removed.

On Friday night a telegram was received from Bombay, purporting to be from Lieut. Dawson, and its authenticity was established

in a very curious manner. There was a peculiarity about Lieut. Dawson's handwriting which threw a little difficulty in the way of correctly deciphering it. In his previous letters the word "Zanzibar" had been read by several persons as "Lawsitar," and the same mistake appeared in the telegram from Bombay, which stated that it came from Lieut. Dawson at Louzitar, showing that the message must have been written by Lieut. Dawson himself. It stated that the Nile question appeared to be settled, that Livingstone's present attention was directed to the underground village, and stores were about to be despatched. It was previously known that there was an underground village or settlement at Rua, to the south-east of Lake Tanganyika, concerning which Livingstone had always expressed considerable interest. Telegrams were always enigmatical, and, as Lieut. Dawson was compelled to limit his communication to fifteen words, his message was super-enigmatical. A second telegram had, however, been since received by the Secretary of State, the Duke of Argyle, from Sir Philip Wodehouse, Governor of Bombay, who was the only person having access to Dr. Kirk's official reports. This telegram stated that Dr. Kirk reported that Livingstone was at Unyanyembe; that he had been to the north of Lake Tanganyika; that the rivers flowed into the lake; and that Mr. Stanley was close at hand with letters. At first sight, it would appear as though this latter telegram was at variance with the previous one from Lieut. Dawson, but there was not necessarily any contradiction. He was now quite willing to pin his faith to the statement that Livingstone had come from Ujiji to Unyanyembe, and the natural inference was that he was on his way to the coast. Of course it was possible that he might intend going back to the underground village, but that was not likely. It was more probable that his attention had been directed to it, rather as the most interesting feature still remaining unexplored in the country. The statement that the rivers flowed into the lake certainly meant that the river at the extreme north terminated in Tanganyika. Ever since Burton and Speke first drew attention to it, geographers had been disputing whether that stream flowed into the lake or out of it. If it ran out of it, it must flow into Baker's Lake, and Tanganyika would be the head-waters of the Nile: on the other hand, if it ran into it, Tanganyika would be a mere inland lake, unconnected with the Nile drainage. The statement that the rivers flowed into the lake was as strong evidence as could possibly be afforded, that Tanganyika was not the head reservoir of the Nile, but an independent lake. The only difficulty in the matter was with regard to the word "rivers," for only one river was known. It was just possible,

however, that the word included the western drainage which Livingstone had been following up from Cazembe, and which must either flow into Tanganyika, or Baker's Lake, or else turn westward to the Congo. When Lieut. Dawson stated that the Nile question appeared settled, it must be inferred that Livingstone had satisfied himself as to the course of those western waters, otherwise the Nile question would not be settled. The solution of this difficulty, however, would have to be deferred until the receipt of further intelligence.

The following letter had been received from Lieut. Dawson :—*

"SIR, "Zanzibar, April 19th, 1872.

"I have the honour to report to you that the Livingstone Search Expedition, which left England on February the 9th, has arrived in safety at this place. The rainy season having set in with unusual severity, will, in all probability, prevent our departure for the interior taking place before the end of May; the caravan-track from Kazeh, near the coast, being reported waist-deep by the last messenger from that place.

"Dr. Kirk, H.M. Acting Consul, has hospitably insisted upon our becoming his guests while in Zanzibar; knowing the rains must detain us, he had made no preparations as regards outfit. Six Nassik boys had arrived from Bombay by sailing vessel, in accordance with the wish in that respect forwarded by telegram by the Council. So far they seem able, intelligent young men, and Dr. Kirk agrees with me that they seem well fit for the fatigue of the journey they have before them.

"Mr. Charles New, of the Mombas Mission, has volunteered his services as a member of, and interpreter to, the Expedition. I enclose a copy of the agreement I thought fit to draw up with him. He has since been to Mombas in the Sultan's steamer *Davia Salam*, and secured the services of some of the men who accompanied him on his previous journey to Kilima-Njaro.

"His Highness Sayid Bergash, who returned from a visit to Mecca, March 29th, on hearing that the Expedition had arrived, gave its members a special reception on April 1st, appearing much pleased with the gift of the Royal Geographical Society, and stated he would use his power to further their objects.

"No communication has been received here from Dr. Livingstone, and none, to my knowledge, from Mr. Stanley up to this date (April 19th).

"Letters to the Sultan from the leading Arabs of Unyanyembe describe the continuance of the war with the surrounding tribes, the Arabs appearing to be unable to make their way out of Kazeh.

"A vague native rumour to the effect that Mr. Stanley, having lost both his European companions, had gone to Ujiji, appears on examination to be without foundation; as is usually the case with these native reports, when sifted, they are found to be contradictory, and are often concocted in the town of Zanzibar by the native merchants to suit their own purposes.

"Dr. Kirk has examined all correspondence to the Sultan from Unyanyembe. The translations I have seen, and no mention of either Dr. Livingstone or Mr. Stanley is therein made.

"Arabs, and others possessing property in Kazeh, are anxious for the speedy departure of the Expedition, as they hope through our means to obtain authentic accounts of the extent of the disturbances around Kazeh, and are doubtless sending exaggerated reports of the magnitude and strength of the party by native messengers to their countrymen.

* This was read at the Anniversary Meeting.

"The route taken will be that of Burton to as near Kazeh as the state of the disturbances will admit. Should affairs be in so unsatisfactory a condition as to render a neutral passage through the hostile district doubtful, in all probability a detour to the southward will be made, in order, if possible, to entirely avoid the contending parties.

"By enlisting men from Mombas as well as Zanzibar, with the Nassik boys, we shall have three distinct parties in the camp, strangers to each other's interests, and the probabilities of any approach to conspiracy will be lessened.

"I have ordered the purchase of the requisite beads, cloth, &c., which are now being weighed and packed in the peculiar manner adapted to the tastes of the native porters of the coast.

"One of the two pocket chronometers lent by Messrs. Parkinson and Frodsham is, I find, given to stopping: I shall therefore leave it at Zanzibar, thus being dependent on the one pocket chronometer and two lever watches of Brock (all of which are going badly) for time.

"I shall send the head man of the caravan in a few days to Bagamoyo, to secure Unyamwezi porters for carrying our goods; of these we shall require about 200.

"Zanzibar is at present in a very unsettled state, owing to a severe hurricane which swept over the island (April 15th), wrecking every ship in harbour except the *Abydos*, and demolishing the greater part of the coco-nut trees and clove-plantations. The barometer fell one inch; w.s.w. being the direction from which the wind blew strongest. The Sultan has lost four steamers and two sailing frigates; about 150 dhows were either driven ashore or foundered at their anchors. Several buildings have been destroyed, and many lives lost. The windows of the Consulate being driven in, the rooms became flooded; the whole of the books, arms, stationery, &c., got damaged, but not to any serious extent. I hear that it is the first time one of these storms has ever visited the island.

"Our delay here will give all a favourable opportunity of studying the native language and character, the various duties keeping all employed.

"I enclose an account of expenditure to this date (April 19th). *

"I understand the Sultan has already written a complimentary letter to the President of the Royal Geographical Society, acknowledging their present, &c.

"I have the honour to be, Sir,

"Your most obedient servant,

"LL. DAWSON,

"Lieut. Commanding Livingstone Search Expedition.

	£	s.	d.
* "Government Grant remaining on arrival of Expedition, March 17th, 1872	557	16	3
To credit by Sir H. Rawlinson's letter at Cocks, Biddulph, and Co.	1442	3	9
Total	£2000	0	0

Dr. Kirk not having drawn the 500*l.* he was authorised to draw.

	£	s.	d.
Bill drawn April 13th, 1872, on Cocks, Biddulph, and Co., 3 per cent. discount	1301	0	11
Amount remaining to credit of Expedition, Cocks, Biddulph and Co.	141	2	10

"The amount drawn, with the Government Grant remaining, will cover expenses of the Expedition, which I have estimated at 1858*l.* 17*s.* 2*d.*, to their return to Zanzibar. Expenses on return and passages home will remain unpaid, and I doubt that 141*l.* 2*s.* 10*d.* will cover these last.

"LL. DAWSON,

Zanzibar, April 19th, 1872. "Lieut. Commanding Expedition."

"I regret that my notes, made during the first half of the hurricane, were lost with other papers in the afternoon—when the Consulate was swept by wind and sea—as they might have proved interesting."

In his despatch announcing the arrival of the Livingstone Search Expedition at Zanzibar, Dr. Kirk said—

"SIR, "Zanzibar, April 3, 1872.

"I have the honour to report that the screw-steamer *Abydos*, consigned to the house of Reiett, Gibson, and Co., arrived here on the 17th ultimo, being 15 days from Suez, and having passed without touching at Aden.

"The *Abydos* brings the English members of the Livingstone Search Expedition, namely, Lieut. L. Dawson, R.N., Lieut. Henn, R.N., and Mr. W. O. Livingstone.

"The Rev. Charles New, of the Methodist Mission at Mombas, whose recent successful ascent of one of the East African snow mountains, and whose long residence of nine years as a missionary in Eastern Africa have familiarised him with the language and customs of the coast, being in Zanzibar, and about to revisit Europe, most generously consented to alter his plans and join Lieut. Dawson's expedition, to which, as interpreter, he will be especially useful. Mr. New, during his stay in Africa, has shown a general aptitude for observing, and a facility in dealing with natives, that promise to be invaluable, none of the other members having personal experience in Africa, or being acquainted with any Eastern language.

"Thus organised, and now joined by the six Nassik boys who were sent from Bombay by the Church Missionary Society, the Expedition is engaged in getting together goods and in purchasing donkeys, and at the end of the rainy season will be ready to start for the interior.

"On the 1st of April the Expedition were presented to his Highness Seyd Burghash at a private durbar. His Highness seemed most pleased with the letter of introduction furnished to Lieut. Dawson by Earl Granville, and also with the elegant silver tray and coffee-pot, the gift of the Royal Geographical Society of London.

"His Highness gives one of his steamers to enable Mr. New to proceed to Mombas, and bring down some of the people who before accompanied him in the interior, and on whom he can depend, and offers his assistance in any other way that may be thought useful.

"I have, &c.,

(Signed) "JOHN KIRK."

The President read the following letter, directed to himself, which had been received from the Sultan of Zanzibar, Seyd Burghash bin Saed:—

Translation of a Letter from His Highness SEYD BURGHASH BIN SAED, *Sultan of Zanzibar, to* SIR HENRY RAWLINSON, K.C.B., *President of the Royal Geographical Society, London.*

"IN THE NAME OF THE MOST MERCIFUL GOD,

"To our esteemed friend Sir Henry Rawlinson, may the Almighty preserve him in health and happiness.

"Your friend is quite well, and the object of our letter is to inform you that, at the auspicious moment of our safe return from performing the pilgrimage to the holy cities of Mecca and Medina, my friend the Consul called on me and presented to me Lieutenant Dawson and his companions, and at the same time he delivered to me the letter from her Majesty's Secretary of State

for Foreign Affairs, the Earl Granville; and also the gift presented by the Royal Geographical Society through the President.

"And it has pleased me much to do that which is considered advisable, and that I am enabled to aid the people of England in their search for my friend Dr. Livingstone, of whom we have no reliable information. And I pray God that certain information regarding him may soon be received. And I will give my aid to those gentlemen whom you have sent in attaining their object.

"And the Consul having requested me to grant the use of one of my steamers to the above gentlemen to convey them to Mombassa to procure men to accompany their expedition, I have done so; and, please God, I will continue to render assistance to those whom you have sent, in their endeavours to explore the mysterious regions of the unknown country, because their object is praiseworthy, and tends to increase our knowledge of what the Almighty has created in these our countries.

"From your friend, Burghash bin Saed bin Sultan; dated at Zanzibar, the 5th day of the month of Safr, in the year 1289 of the Hejira, corresponding to the 14th of April, 1872."

True translated purport,

C. P. RIGBY, Major-General.

June 10th, 1872.

His Highness had shown so much interest in geographical exploration, that it had been thought only due to him, to propose him in the Council as an Honorary Member of the Society, and he hoped he would be elected at the next meeting. The following letter, describing the latest intelligence that had reached Zanzibar from the interior, showed how very cautious Dr. Kirk was in accepting the information he received:—

"MY LORD, "Zanzibar, April 10, 1872.

I have the honour to report that bearers of letters dated from Unyanyembe on the 29th of El Káada, equivalent to 9th February, 1872, arrived here a few days ago: this being the first authentic information we possess from the disturbed districts since that reported by me on the 22nd September last.

"His Highness Seyd Burgash and several of the Arab chiefs, have placed their letters in my hands, from which I have made the selection herewith annexed in translation.

"The situation of the Arabs, according to all written accounts, both public and private, is one of considerable danger, and the advantage for the present seems to rest with the Unyamwezi people, who hold the Arabs, as it were, blockaded, unable to trade, and short of provisions.

"His Highness, however, advises me to receive with some caution the statements made in those letters, and he evidently suspects that the Arabs are desirous of inducing him to send stores and troops, that they may turn to their own profit.

"His Highness's view of matters is certainly supported by the fact that the correspondents in Zanzibar of Sheikh bin Nassib, Saeed bin Salem, and others, have, since receipt of those letters, engaged porters and prepared caravans for Unyanyembe, charged with very valuable consignments of goods,—a proceeding not easily explained if the country were by them really believed to be in the state described.

"I have seen two of the men who came down with the letters,—one being a slave of Sheikh bin Nassib, the other of Saeed bin Salem. Their account is that the Unyamwezi people have been driven off, and only Mirambo, with

whom the original quarrel occurred, left with sufficient power to offer resistance. As these slaves not only passed safely out of Unyanyembe, but have started as bearers of correspondence on their return, the danger mentioned in one of the letters to stragglers outside the settlement would seem to be exaggerated.

"In no letter to which I have had access is mention made either of Dr. Livingstone or Mr. Stanley; nor, so far as I have been able to learn, have any letters been received in transit for New York from the latter. I have myself closely examined the slaves from Unyanyembe as to Mr. Stanley's movements, and learn that, having fallen back with the Arabs on the station on the day of their defeat by Mirambo, Mr. Stanley shortly after set off, in company with a party proceeding to Ujiji, by a roundabout way skirting the disturbed districts; his second white man (mate of an American ship, the *Nevada*, who joined him here) was sent back to Unyanyembe, where he died. So far the native account of what fell under their own observation may be relied on, but great doubt attaches to the further hearsay statements that I now relate.

"These slaves, examined separately, state that, before leaving Unyanyembe, Saeed bin Majid, an Arab of Ujiji, whose name I have before mentioned, fought his way past Mirambo, and entered the settlement, having lost five of his men in an encounter. He brought with him neither ivory nor goods, and had left all but his fighting men at Ujiji. He is said to have reported that, before he left, Dr. Livingstone had returned to Ujiji, and been joined by Mr. Stanley; it is also said that Mohammed bin Gharib had returned, and three others, who had gone on the Manyema route.

"I unwillingly mention such reports, being at the same time wholly unable to vouch for their veracity. Mr. New, myself, and some Arab chiefs, have tried our best to sift them, but without success. They may be pure inventions or prove true statements: the Arabs seem inclined to credit them, while white men, on the whole, doubt their accuracy. Of one thing I am, however, convinced, that the suspicion entertained by people at home, of news being in possession of the Arabs of some misfortune having befallen Dr. Livingstone, which they conceal in order to profit by goods sent to his relief, is wholly groundless and false.

"I have addressed the chief men of Unyanyembe by the slaves now on their return, and who will reach within 30 days; complaining of their having given no intelligence, and urging them to write at once and send on any letters they have in hand from Ujiji relating to the Doctor.

"I have, &c.,

(Signed) "JOHN KIRK,

"Acting Political Agent and H.M. Consul, Zanzibar.

"*The Earl Granville, K.G., &c., &c., &c.*"

Translations of Letters from Unyanyembe.

"Dated 29th El Kaada, 1288.

[After compliments.] "I send you this letter from el Moezi (Unyamwezi); the news is good. We reached on the 10th Ramadan, after loss through smallpox, and on arrival we found the Arabs and the natives fighting, and all the natives on one side, and followed our brethren to the war; but the natives are strong, and it rejoiced us when we heard formerly that our master, Seyd Burgash, was sending troops; then we heard again that he had changed, and when the natives understood this they became very glad and strong, and it was betwixt us, and we pray God to do that which is best."

From Saeed bin Salim el Kemki to Saliman bin Hamed bin Saeed el bu Saedi.

"Dated 29th El Kaada, 1288.

[After compliments.] "There is no more news, but we and Mirambo are at war, and all the Mshenzi (natives) are on one hand. I beg of you to speak with our Lord, Seyd Burgash, that he may send to us troops and munitions of war, or there will be risk to ourselves and our property, and at the date of this letter your slave was in great difficulty. Ullah, Ullah; of what I write to you be careful."

From Saeed bin Salim el Kempi to Seyd Burghash.

"Dated 29th El Kaada, 1288.

[After compliments.] "There is no news, but we and Mirambo are at war, and all the Mshenzi are on one hand against the Arabs, and, since the month of Shâaban, we, the Arabs and the Sowahelis, are fighting with them, but the Mshenzi are still strong. From your kindness, pray send stores of war and men; and we and the people of Mirima are now in great distress. Ullah, Ullah, my master, do not neglect to send troops and stores, and Inshallah! we will overcome them."

From Saeed bin Majid bin Saeed to Seyd Burghash bin Sceed.

"Dated 28th El Kaada, 1288.

[After compliments.] "This letter is from Unyamwezi; the news is all good, through your contrivance, and further what God has brought on us is of his justice and decree in killing men and loss of property; and all the people of the land have one intention against your slaves, the Arabs, and now your slaves are in great trouble. If any one pass a little outside he is seized and killed; and we heard of you that you would formerly send many troops, and the infidels were much afraid; and we, your slaves, awaited the arrival of troops morning and evening, and then we learned that you got letters from bad people who desired to spoil the place, and thereupon you altered your mind; now the infidels are become proud. Of your kindness, please help us, and send troops speedily to your slaves, otherwise they are in great danger with their property, chiefly on it being known that you had altered your mind as to sending troops. Allah, Allah, our Lord, do not delay, for we write this when we see the people strong, and fear the consequences."

From Sheikh bin Nassib to Seyd Burghash.

"Dated 28th El Kaada, 1288."

Of same tenor as the preceding letter.

True translation. (Signed) "JOHN KIRK."

Extract from Mr. Acting Consul Kirk's Despatch to the Secretary to Government, Bombay

"British Agency and Consulate, Zanzibar, April 22, 1872.

". . . . . On the 17th March the European members of the Livingstone Search Expedition arrived in Zanzibar, and took up their quarters at

the British Consulate, where they are busily engaged getting stores ready to proceed for the interior when the rains have ceased. The party has been here, joined by Mr. New, from Mombasa, an experienced traveller and missionary, who has lived nine years in Eastern Africa, and who will be accompanied by a party of men from Mombasa to whom he is personally well known.

"Letters have been received from the Arabs at Unyanyembe'; the war, two months ago, still continued, and the Arabs were unable to trade or go to the coast. Several caravans are ready, and will set out for that country when the roads are again passable. It is reported by the native bearers, but not confirmed in any letters received, that Mr. Stanley has succeeded in reaching Ujiji, and there met with Dr. Livingstone, who is said to be in possession of both supplies of goods formerly sent up country. This report requires to be confirmed, but there can be no doubt that at Ujiji he will find abundant supplies."

Colonel GRANT said the two telegrams which had been received did not throw sufficient light on the subject. Lieutenant Dawson's telegram was not explicit enough, while the other would lead to the supposition that the Nile question was settled; but we have yet to learn how it has been settled. It was now about fourteen years since Burton and Speke were at the Tanganyika Lake, and spent four months, from January to the end of May, in its vicinity. Although sickness is said to have prevented their carrying out a thorough exploration, yet they saw mountains at the northern end of the lake; and Speke went so far as to place the Mountains of the Moon there. He also made the waters to the north fall into the lake. This was not, however, generally accepted in England; but now it is confirmed, for it appeared that Livingstone had visited the northern end of the lake, and found the rivers flowing into it. He did not believe that the word "rivers" referred to any other streams than those to the north. The "underground villages" were known to Livingstone many years ago, and he himself had heard of them when he was in Africa. They were not villages, but an extraordinary natural tunnel to the south-east of Tanganyika, in the country of Rua. The native who described it to him said he had travelled through this tunnel from sunrise to noon. It was about 400 yards wide, and from 8 to 10 miles long, with sufficient light the whole way. When attacked by their enemies, the natives in that part took all their cattle, and all their goods and chattels, into this underground passage, and remained there until the danger was over. This tunnel afforded the only means of crossing an enormous river which flowed at the south-east corner of the lake, the banks on the sides of the river being too steep for boats to land.

Mr. DANBY SEYMOUR asked what instructions had been given to Lieutenant Dawson as to the course he should adopt, in the event of such a contingency occurring as now seemed probable.

The PRESIDENT said the particular contingency which appeared about to arrive had not been thought sufficiently imminent to necessitate written instructions to Lieutenant Dawson on the subject. The matter was left pretty much in his hands, and the Council trusted to his discretion to take the most suitable course.

The following Paper was then read:—

The New Hebrides and Santa Cruz Groups, South-West Pacific.

By Lieutenant A. H. MARKHAM, R.N.

[ABRIDGMENT.]

IN October, 1871, Lieut. Markham, in command of H.M.S. *Rosario*, was commissioned to proceed to those islands of the South-West Pacific, which formed the subject of his paper: the object of Lieut. Markham's cruise being, an inquiry into the complications caused by the outrages committed by commanders and crews of vessels engaged in the labour-traffic, and the consequent retaliations by the natives. The pursuit of this investigation necessitated visits to almost every one of the little-known islands forming the Santa Cruz and New Hebrides groups, some of which had never been previously touched at by a man-of-war. The author prefaced his narrative with some account of what had been done in these seas by previous voyagers; commencing with the period when the spirit and enterprise of the Spaniards, and the Imperial ideas of their Viceroys in Peru, led to the discovery of the Solomon and New Hebrides groups.

In January, 1568, Lope de Castro, the Peruvian Minister, despatched an expedition from Callao, under his nephew Alvoro de Mendana, to discover the mysterious southern continent. After a long voyage across the Pacific, they succeeded in reaching and establishing their head-quarters on that island of the Solomon group known as Santa Ysabel de Estrella. On this expedition, a more complete survey of the islands and channels forming this group was made by the chief pilot, Gallegos, than has ever since been attempted.

Nothing further was done until 1595, when the Marquis de Canete, the then Viceroy, conceived the idea of colonising these islands, and fitted out a second expedition, consisting of four ships, again under the command of Mendana, who was accompanied by his wife, the Lady Isabel. The Marquesas and Santa Cruz were discovered on this occasion: on the latter island an attempt at a settlement was made, but the persistent hostility of the natives rendered it unsuccessful. This expedition was most unfortunate, losing two vessels and crews, and finally their gallant commander, who appointed the Lady Isabel as his successor; and it was owing to the courage and energy displayed by this brave lady, that the remnant of the expedition succeeded in reaching Manilla.

Notwithstanding the failure of Mendana, Don Pedro Fernandez de Quiros, who sailed with Mendana as chief pilot, on the second voyage, and described as an experienced navigator, foreseeing the

advantages to be derived from further discoveries, memorialised the Spanish Government to that effect, and was rewarded for his perseverence by being appointed, in company with Don Luis Vaez de Torres, to the command of another expedition, which left Callao, on the 21st December, 1605, and proceeding southward, on the 7th of April in the following year, anchored off the island of Taumaco (one of the Duff group). From Taumaco they sailed south-east, passing the islands of Tecopia and Nuestra Senora de la Luz; and on the 30th reached their most southerly point in Vera Cruz Bay, in the island of Espirito Santo (the most northerly of the New Hebrides). Quiros' relations with the natives do not seem to have been of a more amicable character than Mendana's, and his attempts at settlement were equally futile. He was at last forced to return to Spanish America; but, undaunted by ill-success, he prevailed upon his Government to entrust him with the command of another expedition; but died at Panama, when about to organize it. His companion Torres sailed round the northern end of Espirito Santo, and afterwards discovered the Strait which now bears his name.

No fresh attempt was made to navigate these seas until 1767, when Capt. Philip Cartaret, in an old sloop called the *Swallow*, cruised along the eastern side of the Santa Cruz group. His vessel was, however, ill-found and leaky, and most of his men sick with scurvy; little addition was therefore made to the knowledge already obtained by Mendana.

Cartaret was followed, in 1768, by the French expedition under M. de Bougainville, who first sighted the islands of Aurora and Pentecost, and landed on an island to the westward, to which he gave the name of L'ile des Lepreux, from a cutaneous disorder with which the natives were affected. He then passed through the Strait to the south of Espirito Santo, and continued his voyage westward.

In 1769, Capt. Surville, another French commander, visited the Solomon group.

These islands were next visited in 1774 by the great navigator Cook, during his second voyage, in the *Resolution*, and by him named New Hebrides. On the 18th of July in that year, Cook sighted the northern point of Aurora Island; then proceeding south, between the islands of Aurora and Lepers, passed the volcanic island of Ambrym; and, turning west, anchored in Sandwich Bay (Mallicollo). He next directed his course south-west, touching at Erromango and Tanna. On the 21st he saw Annatom, the most southerly island; then steering north-west, on the 25th opened the great bay of Vera Cruz, in Espirito Santo: thus circumnavigating the group,

and completing their discovery, commenced in 1605, by the adventurous Spaniard, Quiros. Continuing his voyage westward, on the 4th September he discovered New Caledonia.

The unfortunate La Perouse, who started from Botany Bay in 1788, and whose fate, for forty years, remained a mystery, was subsequently discovered to have been wrecked off Vanikoro. In the following year, Capt. Bligh, whose name will long be remembered in connection with the mutiny of the *Bounty*, passed through the northern islands of the Hebrides in an open boat.

In 1791, Capt. Edwards, in the *Pandora*, whilst in search of the *Bounty*, passed through the Santa Cruz Islands, and discovered the two islets further east, named Cherry and Mitre.

In the same year, the French expedition, under D'Entrecasteaux, despatched in search of La Perouse, after sailing through the southern portion of the Hebrides, and sighting the Volcano of Tanna, discovered the "Isles Beaupré" of the Loyalty Islands, subsequently visiting New Caledonia, Santa Cruz, and the Solomon group.

In 1796 Capt. Wilson, in the first missionary ship, *The Duff*, sighted some islands north of Santa Cruz, and called by him the Duff Group; the principal one had, however, been already named Taumaco by Quiros.

Several minor and unimportant discoveries were made by East Indiamen early in the present century.

In 1826, a Capt. Peter Dillon, on his way from Valparaiso to Pondicherry, touched at the island of Tecopia, and was shown by the natives some articles of European manufacture, which they had obtained from two vessels wrecked, many years before, on an island to the eastward, called Vanikoro; and from information obtained by inquiries he was convinced of their identity with the two ships of La Perouse. From the representations made by Dillon to the East India Government, he was appointed by the Company to the surveying ship *Research*, with instructions to follow up the traces he had already found; and he finally succeeded in obtaining many relics of the ill-fated expedition.

Dillon's investigations were continued by the French Commander, Durmont D'Urville, in the corvette *Astrolabe*, who, on the 14th of March, 1828, erected a monument on the island of Vanikoro to the memory of his unfortunate countrymen. He afterwards visited the Solomon Islands in 1838, and fixed some astronomical positions.

These groups were also visited by Captain (now Sir Edward) Belcher in the *Sulphur*, 1840; Capt. Le Mignon, in the French ship

Jupiter, 1846; Capt. Erskine, in the *Havannah*, 1849; and Capt. Denham in the surveying ship *Herald*, 1853-4.

Lieut. Markham said, although these expeditions, from Mendana to Denham, extended over a period of nearly three centuries, little had been really done in the way of careful surveying, and we were as much if not more indebted to the early navigators for our knowledge of these islands, as we were to any later explorations; but, of late years, two opposing influences had combined to extend our information—the lawless acts of unscrupulous traders, and the labours of zealous missionaries. In 1840, a lucrative trade in sandal-wood with China sprang up, resulting in constant collisions between the natives and the ruffianly traders.

In 1839, the London Missionary Society established a native mission in the New Hebrides and Loyalty Islands, and was followed in the same year by the Samoan Mission; in 1850 by the New Hebrides Presbyterian Mission; and eight years ago by the Melanesian Mission, presided over by Bishop Patteson.

In 1860, Dr. Berthold Seemann was sent by the Colonial Office to Fiji, to report upon the capabilities of those islands for cotton-cultivation; his report was of such a favourable character, that several plantations were formed, both there and in Queensland, and the demand for labour was so great that kidnapping became lucrative, and the atrocities of former years were completely eclipsed by those of the present. The disgraceful manner in which the labour traffic was carried on, led to an act being passed by the Queensland legislature for the protection of the unfortunate natives, but it is said to be of little use in checking its abuses.

In consequence of some retaliatory outrages on the part of the natives, Commodore Wiseman, in H.M.S. *Curaçoa*, proceeded to these islands in 1865 and destroyed some native villages on the islands of Tanna and Erromango. Similar reasons also necessitated the visits of H.M.SS. *Blanche*, *Challenger*, and *Rosario*, in 1868 and 1869.

Lieut. Markham next proceeded to give the result of his own observations while in command of the *Rosario*. He described the New Hebrides as being purely volcanic; while the Santa Cruz were a combined reef and volcanic formation; of the Duff Group little was known, but the Swallow Group were wholly reefs. The line of volcanic action in these islands seemed to follow their general direction—about S.S.E. and N.N.W. Nearly all the volcanoes observed by him he found in a state of activity. Tinahula in Santa Cruz, the craters of Ambrym and Lopevi, on the islands of those names, and the largest and most southerly volcano of

Yasowa, in Tanna; the latter, on the occasion of Lieut. Markham's ascent, sending forth sheets of flame, accompanied by loud explosions, and hurling huge masses of scoria to the height of 1000 feet.

The reef islands north of Santa Cruz he considered differed in formation to those in Torres Straits. He described the scenery on these islands as lovely, and the vegetation varied and beautiful, the waters around abounding in brilliant-hued fish, while the rocks were the haunt of every kind of tropical sea-bird; he had, however, no opportunity of collecting specimens.

The natives of the New Hebrides and Santa Cruz groups appeared to be of the Melanesian or Papuan type, with curly hair and skin of a sooty black. The physique varied slightly in the different islands: those of Tanna being much the finest made, and having an extraordinary fashion of dressing the hair, which is said to take three or four years in the perfection; the dress of the Santa Cruz and Swallow Islanders consisted chiefly of shell-ornaments. On the island of Nguna (New Hebrides) he met with with a female albino, a wife of one of the chiefs; a male of the same variety was also seen on the island of Mallicollo. Yams formed the staple article of food; the crops being planted in July, and gathered in the following March or April. Pigs, fish, and fowls were occasionally consumed at their large feasts, and cannibalism was practised when opportunity offered. The huts differed much in size and shape in the various groups. Of their religious ideas little could be ascertained, although idols were observed on some of the islands, yet time did not allow of any investigation. The languages on the different islands were totally distinct, some of the larger islands possessing two dialects. Vocabularies had been collected at various times by Quiros, Cook, D'Urville, Dr. Geddie, and Mr. Heath. The principal weapons used were bows and arrows (with which they are remarkably expert, sending arrows a distance of 120 yards), spears, and clubs; and of late years guns and axes, supplied by the traders. While at Byron Bay, Santa Cruz, Lieut. Markham had an opportunity of witnessing an engagement among them, in which no regular order of battle was preserved, each man fighting on his own hook.

The canoes are small, with outriggers, usually managed by two or three men with paddles. The islanders are a merry, lively race, music and dancing being favourite amusements.

Lieut. Markham said, in conclusion, that he thought the most curious fact connected with these natives was the manner in which the fine Polynesian race dovetailed with the ill-looking Papuans. The islanders of Cherry and Tecopia were purely Polynesian: he

felt it would be interesting to ascertain the exact limit of the two races, and expressed an opinion that we had still much to learn concerning these islands and their inhabitants.

The paper will be printed entire, with map, in vol. xlii. of the 'Journal.'

The BISHOP OF LICHFIELD said the islands to the eastward of the Fiji group were almost uniform in language. There was really no great diversity of language over the whole extent of the Eastern Pacific, including the Marquesas, Tahiti, Friendly Islands, and the Society Islands, the language of New Zealand being the original one. The larger groups seemed to have acted like great nets, and caught the stray canoes that had been drifting about before the storm; consequently the inhabitants had become more mixed than in the smaller groups. He had invariably found that the smaller the island the more certain it was that the language would be similar to that spoken in New Zealand. It was well known that the New Zealanders came at a bound from the Sandwich Islands to the Navigators' Islands; and thence, within the memory of their own traditions, thirty or forty generations back, they came to New Zealand. Some words which were primary in one island were in another only secondary, and thus a superficial observer would be led to think the difference in the languages much greater than it really was. The great meeting-place of the various dialects was the Fiji Islands, where the strangest possible admixture of languages prevailed. To the westward of those islands the Papuan type predominated largely, but even there continual deviations from that general rule were to be found. It was strictly true that in many of the larger islands the people at one end could not understand those at the other. He had learnt what he thought was the language of New Caledonia, but when he went to Captain Cook's Harbour, nearly to the north of the island, where he desired to plant a mission station, he found all his labour had been in vain, for the people did not understand a single word he uttered. When he said he learnt the language, he meant the two or three hundred words which were all that was required in a language. Throughout the island of Mare the language was uniform, and also throughout Lifu; but in Beaupre, while the original inhabitants occupied the northern end, the southern end was peopled by a distinct colony, which came from the Kurule Islands. Owing to their diversity of race and speech, these people were continually at war, and no amalgamation had taken place. On the island of Mare, however, the amalgamation was going on. A canoe had drifted from the island of Tonga to Mare, and established a colony there. Intermarriages were taking place, and in the course of a few years the language in that part of the island would be considerably altered from the language in the other portion, consequent upon a large infusion of the Polynesian element. The migrations which took place were not always accidental, for in the Caroline Islands the natives started off in swarms in their canoes to find a new home, their former homes having become too crowded. On one occasion he picked up a canoe off Vanua Levu, with a man on board who had drifted from Erromango. All these facts showed what a vast amount of interchange of people, and consequently of languages, had been going on through many centuries. The discovery of the wrecks of the two French ships on the island of Vanikoro was also a proof of the communication that was carried on between the different islands. This they were perfectly able to do, their canoes being fit to traverse immense distances. The difficulty, then, with regard to the peopling of these islands entirely disappeared before such actual facts as had frequently come under his own

observation. The maritime capacity of the people varied greatly in different islands. In Aneiteum and Tana the canoes were scarcely better than trees roughly hollowed out, in which the natives were just able to stretch across to Erromango, which lay in sight. In Erromango, however, there were no canoes; while those on the other side, in the Sandwich Islands, were of a superior kind. The only way in which he could account for the fact of the want of canoes in Erromango was, by supposing that the inhabitants, who were distinctly Papuans, had been brought there in a state of slavery, that their masters, by some means or other, having disappeared, the black race remained, retaining their old habits as if they came from the centre of a great continent. To the north of the New Hebrides, in the Solomon Islands, the outrigger quite disappeared, and the inhabitants were able to take long sea-journeys without fear. The Friendly Islands had more of the Polynesian than the Melanesian element, while Vanikoro and others were distinctly Polynesian. To the north of Santa Cruz the Reef Islands were Melanesian. The work of mastering the different languages was very considerable, but Bishop Patteson, before the close of his life, was able to preach in seven or eight different languages, and converse fluently in twice or three times that number. The general character of the islands was also very varied. The coral reefs between New Caledonia and the Loyalty Islands would form a complete example of Darwin's theory of coral reefs. The Island of Mare was only an upraised reef, as was also Lifu. Nea was the same, with the exception that the central lagoon was still covered with water to a depth of from nine to seven fathoms. New Caledonia appeared in the course of ages to be continually sinking, while the Loyalty Islands were continually rising.

Captain SHERARD OSBORN, R.N., said the volcano which had been described in the paper was visited by Captain Cook in 1774, and the eruptions and discharges at that time appeared to have been similar to those observed by Commander Markham. Nearly 100 years before that, another navigator had seen the volcano in active operation. This was the most remarkable case of a volcano in constant action that he had heard of in any part of the world. The whole Pacific Ocean might be represented as the crater of one vast volcano, the line of action extending from Kamschatka to New Zealand, and the volcanoes of South America across to those of the Philippines. He did not think the theory of the absence of coral reefs depending on volcanic action was borne out by facts.

The PRESIDENT said the coral theory was that the insect could not build at a great depth under water, owing to the pressure. It was, therefore, always endeavouring to reach the surface, and whether coral reefs were present or not, depended on the upward or downward action caused by subterranean movement. The admixture of the two races in these islands, as described by the Bishop of Lichfield, was an exceedingly interesting subject, and the explanation which had been given appeared to him (the President) eminently satisfactory.

Fourteenth Meeting, 24th June, 1872.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS. — *J. Palmer, Esq.; Capt. William Man; Charles Burt, Esq.*

ELECTIONS.—*William Cambridge Barber, Esq.; Ramsey Blakemore, Esq.; Samuel Booker, Esq.: J. G. T. Forbes, Esq.; John Fowler, Esq.*, C.E.; *Dr. W. W. Hunter; Rev. William Rowe Jolley; Capt. William Man; Charles Norris, Esq.*

ACCESSIONS TO THE LIBRARY FROM JUNE 10TH TO JUNE 24TH.—'Joannis Bisselii Argonauticon Americanorum.' 1567. Donor J. V. Irwin, Esq. 'The Canoe and the Saddle.' By T. Winthrop. Boston, 1863. Donor J. V. Irwin, Esq. 'Lithologie du Fond des Mers.' Par M. Delesse. 2 Parts and Atlas. Paris, 1872. Donor the author. 'Missionary Voyage to the South Pacific in 1796-1798 in the Ship *Duff*, Capt. J. Wilson.' 1799. Purchased. 'The Survey, &c., of Port Phillip.' By G. W. Rusden. 1872. Donor the author. 'The Book of the Conquest and Conversion of the Canarians in 1402.' By Jean de Bethencourt. Translated by R. H. Major, Esq., Hon. Sec. F.R.G.S. 1872. Donors the Hakluyt Society. 'A Ride through the Disturbed Districts of New Zealand, &c.' By H. Meade. 1871. Purchased. 'Osterreichisch-Ungarische Expedition nach Siam, China, und Japan.' Von Dr. K. von Scherzer. Stuttgart, 1872. Donor the author. 'Mountaineering in the Sierra Nevada.' By Clarence King. 1872. Purchased.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF JUNE 10TH.—Outline Map of India, showing the Railways in operation and those under construction, 1872. Presented by the Great Indian Peninsula Railway Company. Atlas: Lithologie du Fond des Mers. Par M. Delesse. With 2 volumes of letter-press. Presented by the author.

The following Paper was read:—

Central Asia in 1872. By ROBERT B. SHAW, Esq., F.R.G.S.

IN attempting to give some account of the progress of discovery and events in Central Asia (or rather in that eastern part of it with which I am acquainted), I cannot report any explorations in which I have been personally engaged, since I had the honour of describing, in a letter to our late President, Sir Roderick Murchison, my wanderings in the high plains and dark gorges of the Upper Shayok in 1870. Circumstances prevented any such journey last year. I was, however, stationed in Ladâk during the whole season, and enjoyed the best opportunities of questioning the numerous travellers from Central Asia who frequent that mart, and of sifting all the information they were possessed of.

I must, therefore, hope for the indulgence of the Society this time, if I give only second-hand information; trusting to be able,

at a future time, to show some sense of the honour the Society has done me in making me one of their Medallists, by undertaking other explorations in those regions.

Ladâk is singularly well placed for inquiries of this nature. Though a very small town itself, yet being, as it were, on a four-cross road, it attracts the men of many regions. There are to be seen the wild-looking Afghan, with his long black curls, and an old flint-lock pistol in his girdle. He has spent the preceding summer in Samarkand, where he has visited the Russian cantonments, and compared them with those of our own soldiers in India, where he has been spending the winter. His temper is hot, and he is apt to cut short a bargain, when he is tired of the haggling, by a volley of abuse or a blow. When not excited, however, he is very courteous in his manners, although free-spoken.

Next him comes the stoutly-built, pig-tailed tea-merchant from Lhassa, in Greater Tibet, who has no manners at all. He is merely a good humoured-looking barbarian, with a grin ever ready on his face, where his eyes are set so far forward, and his nose so far back, as to form an almost flat round surface for a countenance.

Then there is the handsome, rather Jewish-looking man of Badakhshân, with his casket of precious stones. His beard is almost brown, and his eyes sometimes hazel. He is the man to tell one all about the Pamir Steppe, with its lakes, and the various sources of the Oxus, which he yearly visits on his way to his home. Unfortunately, his notions of anything off the regular road are hazy; and though he perfectly remembers the river which you are inquiring about, yet he generally forgets which way it runs, and overwhelms you with voluble Persian, a language admirably adapted for vague statements.

Then there is the Chinaman from Yârkand, rather depressed-looking, and without his pig-tail, for he has had to turn Mussulman to save his life in the great slaughter of his countrymen in 1864. His home is generally in Kansuh, the most north-westerly province of China Proper, and he knows something about the Tungânis and the great high road to Pekin. But his information can only be got at through a Turki interpreter, and the double translation makes communication slow.

After that the yellow-robed Lâma, from Great Tibet, on his ambling mule. He is come on an ecclesiastical mission, to inspect the subordinate monasteries of Western Tibet. He wears a broad cardinal's hat and twirls in his hand a prayer-wheel. He could perhaps tell us something about the brave French missionaries who have been shut up in Bathang (between Tibet and China) for

years past, and several of whom have been murdered by the authorities. But our Lâma is not communicative, and ignores them.

The Yârkand Haji is more sociable. He has combined spiritual and worldly profit by a trading journey through India, wound up by a pilgrimage per steamer from Bombay to Mecca. He has probably buried a wife and one or two children by the way, for the Yârkandis die fast in the climate of India. Very likely he has visited Constantinople, and stayed six months in Egypt. With their slender purses and slow means of progression, these Central Asiatics put us to shame as enterprising travellers. They will often start on a journey of several thousand miles with money only sufficient to last them a week.

In the same crowd, we have the half-naked Indian *jogi* or fanatic, covered with ashes and shivering with the cold; the Sikh merchant, the Dogra soldier, and other Indian types too numerous to mention.

Such are some of the sources from which one has to gather intelligence. The best point in them is that the information cannot be concerted between men of such different origins. Hence wherever their testimony agrees, it is likely to be true.

A great revolution has recently taken place in our ideas of the mountain-systems of Central Asia. Humboldt's conception of them was this: There were five ranges, of which two (the Altaï and the Thiân-Shan) ran about east and west, being placed *en echelon*, as one would say of an army, with their right shoulders advanced. Opposite them were two others (the Himâlaya and the Kuen-lun), with *left* shoulders advanced so as to approach the opposite line on the west. Across the interval thus left there ran the *Bolor* range from north to south, like a neutral army placed in observation. This was roughly his view.

But recent observers, both from the Indian and the Russian side, are inclined to alter the arrangement. Admitting that the Altaï and the Thiân-Shan are rightly placed, they would join the three others, viz. the Himâlaya, the Kuen-lun, and the (so-called) Bolor, into one chain, or rather one system, running as a whole nearly from south-east to north-west, and uniting with the northern system in a huge knot or boss somewhere west of Yârkand.

With regard to the unity of the *Kuen-lun* with the rest of the Himâlaya, we have seen it, and can testify to it. If, when you go up into the mountains, you are to consider yourself as being in the same chain until you come down again, then certainly the Kuen-lun and the Himâlaya are one. It is true you are not always at the

same level. You cross parallel ridges or ranges more or less high, and descend into valleys more or less deep. But, strange to say, the depression between the Kuen-lun and the rest of the Himālaya is much less deep than any of the other furrows. If the valleys of the Beâs, Râvee, or Chenâb, descending to 3000 and 4000 feet above the sea-level, are not considered as separating off the mountains outside of them from the mass of the Himālaya, why should the Kuen-lun be called a separate chain, when to reach it you scarcely descend below 15,000 feet—a height nearly equal to that of the summit of Mont Blanc?

The following may serve as an illustration. When I accompanied Mr. Forsyth's expedition across this region in 1870, the Maharâja of Cashmeer sent with us a high official of his, a man born and bred in the plains of India. Old Bakshee Ram (as his name was) preceded us by a few days, being carried in a palanquin by a dozen porters. One day we met him returning with a rueful face, holding his head with both his hands, and declaring that he should have died had he not come down again at once. Some of our party asked him how long he had stayed on the top? "Top!" he cried (in English), "it is *all* top."

Now, this is the very space where, as some geographers tell us, the Himālaya is so clearly separated off from the Kuenlun as to merit the appellation of a distinct chain.

In a word, if the Oberland is a part of the Alps, then the Kuenlun is a part of the Himālaya, only with a far stronger case in its favour.

Now comes the question of the unity of the so-called Bolor Range with the Himālaya, a question bound up with the name of Major Montgomerie.

In considering the mountain-systems of Central Asia, we should, I think, understand them better if we modified our conception of what a range is. Ordinarily, I suppose, when we hear a range spoken of, we picture to ourselves a ridge of land studded with high points, and from which all the streams flow in opposite directions accordingly as they rise on one side or the other of the mountains. In other words, we identify a watershed with a range. This would generally be a correct view, but in the region we are considering it is nothing of the kind.

I will not detain you with an elaborate proof of this. In a letter to our late revered President, Sir Roderick Murchison, which had the honour of being read before this Society, I described my astonishment at walking across, in an open plain, from waters which run towards Central Asia to others which flow into the Indus; while the mighty mountain-range, topped with glaciers and perpetual

snow, which for days before I reached it had seemed to bar all access to the southern regions, was found, on a nearer approach, to be riddled through and through by the streams which rise in the northern plateaux.

More recently a striking proof of the same fact has reached me. Last year I had recommended certain shooting-grounds north of the Karakoram to some officers of the 37th Regiment in search of sport. Capt. Skinner and his companion, finding themselves on the Upper Karakash River, and their time being scanty, sought to return by a short cut to the Indus, leaving the Karakoram Pass to the west of them. On arriving at Leh their first inquiry of me was, "What has become of the Karakoram Range? it has vanished!" In fact, they had been tempted to follow a broad opening southward from the Karakash River, expecting always to cross the lofty range marked on the maps, but, after traversing several high barren plains, had found themselves on the banks of a stream running into the Indus, without having crossed any range at all.

Having thus abolished the Karakoram Chain, we may, I think, proceed to do the same with several others, and notably with Humboldt's Bolor or Belut-Tagh. The explorations of the Russians from Khokand and Samarkand, and of Major Montgomerie's men from the Upper Oxus, seem to show that the highlands of the Pamir, Alaï, &c., participate in the character of the country I have just described. High snowy ranges there are, but they do not determine the main flow of the rivers. On the contrary, the crossing from one great river-system to another is generally over an almost insensible rise.

The same might be gathered from the statement of a Kashmiri prisoner whom we met with in Kâshghar. He had been captured in one of the wild valleys south of the watershed (near that where the unfortunate Hayward was afterwards murdered). In accordance with the custom of that region, he had been sold as a slave. Wounded bare-footed, almost naked, he had been tied to the tail of his master's horse, and led, with other slaves, across into Central Asia. In such a plight he would probably have magnified fourfold any difficulties of the road; but he could not, when asked, remember having crossed any mountain-pass on the journey, and only after repeated inquiry recollected a certain spot where the waters had been shed in opposite directions.

Many other proofs might be brought that there is hereabouts no distinct watershedding range. But rather, from at least as far east as the sources of the Indus to near the meridian of Khokand, we have a highland region whose centre is occupied by a broad belt

of neutral ground in which originate, almost intermixedly, the waters running in both directions from it, together with many which flow in neither, but lose themselves in sands or in isolated lakes.

The neutral belt has a direction roughly from south-east to north-west, and belongs equally to the several hydrographical basins.

Lofty mountain ridges also occupy this region, as they do the rest of the highlands, but their axes of upheaval and the strike of their strata do not always, or even often, correspond with the direction of the neutral belt of watershed. Many of the most striking and magnificent mountain-masses would be of but little importance in a hydrographical map. A mountain of 28,000 feet may merely divide two rivulets, while the vast basins of Central and of Southern Asia are separated by a few yards of level sand.

I leave it to geologists to determine the reason of this condition of things. But to the eye of the ordinary observer the effect is as if in this ancient region the old landmarks had become worn out, and the irresistible waters had eaten back into the rocky barriers which formerly bounded them, and had begun to re-fashion the surface of the land at their own will. The rivers have rebelled against the tyranny of the mountains, and have declared their independence.

The whole of this high region is *one* in character, and merits a single appellation. I cannot help thinking that this was what Marco Polo understood by *Bolor*. Having ascended from the western side into the Pamir Steppe, he describes a vast desert region of rivers and mountains stretching to the eastward for forty days, and calls it Bolor. It is evidently not on the route which he himself followed, for by that route he reaches the city of Kâshghar in twelve days.

Some German or Russian geographers have invented a city and river of Bolor on the west of the Pamir; places unknown to the natives of those regions, and, moreover, contradictory of the statement of Marco, who locates the *desert* of Bolor *east*ward of Pamir. But the fables of the German Count have already been disposed of by our President, so we will leave the city of Bolor to fade into the same mist of confusion as the Karakoram Range and the kingdom of Prester John.

So far, in fact, from there being any north and south running Bolor Range as Humboldt supposed, it is now known that the loftiest ridges of the Pamir region run more nearly east and west. Such is the line of mighty peaks seen by Hayward and myself from

Kâshghar, and of which the culminating point is called by the natives *Taghâlma*. Such also are the ridges described by the Russians as dividing the Upper Jaxartes from the Kizil-su and Zarafshân, and these again from the head-waters of the Oxus. So much for the Belut-Tagh.

If we look upon the mountain-systems which embrace Eastern Turkistân as a bow which is bent nearly double, it is the part about the handle or the middle of the curve which we have been considering.

Let us now turn to the two horns of the bow, and first to the southern one. This is the great Himâlayan mass, of which the most northern flank has been called the Kuen-lun. At one time it was thought that this Kuen-lun constituted a separate and continuous range running in an unbroken line almost into China.

To say nothing of the fact that the Karakash River runs right through this supposed important watershed by the gorge of Shahidulla, we have now an itinerary from the Pangong Lake to Khotan, by a more easterly route than any which has yet been described in detail. An examination of this itinerary shows that the route, starting from a level of 14,000 feet above the sea at the Pangong Lake, rises gradually to a height of about 17,000 feet, which in these regions is the level of the tablelands. After passing across the corner of a basin *draining eastward*, another gradual rise takes the traveller across into the heads of the streams that run northward into the province of Khotan.

If we may assume this assigned elevation of about 17,000 feet to be correct (and it is gathered from a comparison with known heights), we have here a considerable falling off in the level of the watershed. Further westward, about Chang-Chenmo and the Karakoram, the roads rise to 18,000 and 19,000 feet in crossing over to the Central Asian basin.

Moreover, we now hear of a vast tract of country in this direction occupying some 6 or 7 degrees of latitude, where the whole drainage is from west to east. From near the Upper Indus gold-fields, on the south, up to the parallel of Charchand, on the north, we hear of considerable eastward-running streams.

Now, this is the very region where geographers formerly wished to place a continuous snowy Range of Kuen-lun, also running east and west. It is probable, however, that such a range would shed its waters northwards; and I think we may gather from the facts I have stated that the country sinks towards the east, and that no continuous snowy range maintains its elevation in that direction.

The people of the Upper Indus, while denying any knowledge

of a regular road to the eastward of the one which I have given, yet declare that the whole country is passable in every direction, and only not frequented by travellers because no business takes them that way.

From the same informants I hear vague rumours of nomad tribes far to the eastward, whom the Tibetans call Sokpo, and who are probably of the same kindred as the Mongol tribes met with by Huc and Gabet near the Koko-Nur. These tribes of Sokpo have often invaded Ladâk, where their name is held in great terror, as also is that of the Hor, or Mussulman Tartars from Eastern Turkistân. The Ladkis relate how, several hundred years ago, an incursion from the north was successfully resisted by the people of the country, and how a large body of them was cut off and massacred. In commemoration of this deed a large monastery was founded on the hill overhanging the town of Leh, and under the foundations of the building were buried the skulls of several hundred of the enemy slain in this encounter.

Invaders of the same race must have penetrated far south, and nearly into India; for even in the province of British Lahaul, graves have been discovered containing skeletons, together with arms and utensils of strange make, ascribed by local tradition to northern invaders. The fact of their having been buried, and not burnt, proves them to have been Mussulmans by religion, as both Hindus and Buddhists burn their dead.

Regarding these incursions and other events in Western Tibet, I hope soon to be able to furnish some information. It had hitherto been supposed that all the early annals of the country had perished in the burning of the monasteries, when Ladâk was over-run, some 200 years ago, by an invasion from Baltistân. General Cunningham, when engaged, in 1848, in collecting materials for his valuable work on Ladâk, could find no records older than, I think, the beginning of the seventeenth century. But last year I succeeded in making friends with the ex-Râja of Ladâk, a descendant of the old family which had reigned many centuries in that country when they were dispossessed of their petty kingdom, nearly forty years ago, by the Sikhs. This ex-Râja, who now occupies himself exclusively with the Buddhist religion and literature, such as it is, is in possession of annals dated a very long time back, and partly printed by the wooden-block type process known in Tibet. The earliest and more valuable of these annals had hitherto been concealed by his family, through a vague feeling of distrust and fear lest these records of the early glories of their race might be taken from them. I have, however, been

entrusted with the loan of them; and I believe that, during the long months of the past winter, three or four lâmas have been engaged in one of the monasteries of Ladâk in transcribing for me these two volumes, which may, perhaps, throw some light on the earlier history of the region. They were to be transcribed in the Tibetan language in which they are written, and after that will have to be translated into Persian, when they will become available for reference by European inquirers.

Besides books, the Tibetans have another mode of recording past events, which is by placing coins and written sheets inside the heads of their idols; in the same way that we enclose a current number of the 'Times,' and a collection of coins, under the foundation stone of a new building. Their idols being made of clay, covered over with plates of gold or brass, occasionally, in the lapse of centuries, fall into disrepair, and have to be renewed. This happened to one of the chief images in Ladâk last year; but unfortunately he was quite a recent creation, and the contents of his brain proved to be of little interest, being only coins of the reign of Shah-Jehân.

If the former invaders of Ladâk had possessed more antiquarian enthusiasm, it is probable that their iconoclastic propensities would have been still further developed.

To return to the highland homes of the invading Sokpos. We have seen that the Kuen-lun is probably replaced further east by vast irregular high plateaux draining eastward, and which must also diminish in height to the northward, in order to attain the lower levels of the deserts of Takla-Makân, and Gobi. Charchand, which lies on the skirts of these highlands, cannot be above 6000 feet, judging by its produce, and its river descends for six days' march to the Lake of Lob further north. This lake is probably formed by the waters of Eastern Turkistân; but whether the united Rivers Yârkand and Tumân flow directly into it or not, it must be one of the lowest points in the region to allow for such an agglomeration of waters, and, therefore, is probably not more than 2000 feet above the sea-level, allowing for the descent of the Yarkand River in some 350 miles of its course from the city.

I will not detain you with accounts of the dwellers by Lake Lob, who are said to be clothed in the bark of trees, to feed on fishes, and to speak the language of birds; nor with the terrors and apparitions of the neighbouring desert, all in the style of Marco Polo, which are current to this day. For here we are brought face to face with the opposite or northern horn of the great bent bow to which we have compared the mountain-systems of Eastern

Turkistân. Into Lake Lob there comes a stream from the Thiân-Shan Mountains, passing by the town of Karashahr, at a distance of two days' march up from the Lake. Thus the Charchand River, the Lake of Lob, and the stream of Karashahr form together the string of the bow. That portion of the great desert which lies inside the string, or to the west of Lake Lob, is properly called the Takla-Makân; while the greater desert to the east up to the Great Wall of China and the wilds of Mongolia is the Gobi.

Here we again come into contact with Russian enterprise, for just beyond the Thiân-Shan Range is the scene of their latest advance. We have before compared the Thiân-Shan and the Altaï ranges to an army *en echelon* in two lines. The front line is the Thiân-Shan, and between its left flank and the right flank of the Altaï, there extends, as it were, a cloud of skirmishers in the shape of lesser mountains. It is into the midst of this space that the Russians advanced last year, when they took Kulja.

At that time the Atalik-Ghâzi, or new Ruler of Eastern Turkistan (whom I visited three years ago), was engaged in a war with the Tungânis, a mixed race of Mussulmans, who inhabit the region round the extreme eastern end of the Thiân-Shan Mountains where they sink to the level of the great plains. As we are likely to hear more of these regions within the next few years, it is as well to note that the Tungâni settlements form a kind of crescent embracing within its arms the end of the Thiân-Shan Range. The northern arm of the crescent, therefore, comes in between the Thiân-Shan and the Altaï mountains, while its centre and southern arms intervene as a fertile strip between the former range and the great desert.

The two chief cities are Urumchi, on the north, and Turfân, on the south; and the communication between them lies either across the mountainous country formed by the sinking of the Thiân-Shan Range, or else by a long détour eastward round its end. Between Urumchi and the Russian territory of Almaty or Vernoj lies the hilly district of Kulja, which I have compared to a cloud of skirmishers stretching between the Altaï and the Thiân-Shan. We are now able to follow the moves and countermoves of the Atalik-Ghâzi and of the Russians.

The former, during the year 1870, being attacked by the Tungânis from Turfân, drove back his assailants and conquered the whole of that portion of their territory which lay on the south of the mountains. He followed up this success by crossing into the northern side and attacking Urumchi. Here, however, an advanced guard of 2000 men, which he had sent forward, was cut off and destroyed

by the enemy, and he himself was beleaguered for some time in a position which he had taken up and fortified. But the Tungânis, although they were able to check his advance, yet could not get rid of this dangerous intruder from their country. At this point both parties happened to remember that they were fellow Mussulmans. Appeals were made to their common religion. A venerable and holy man of the Tungânis came out and said to the Atalik-Ghazi: "Why should we fight, we are brethren?" Peace was made with much effusion, presents and wives were exchanged between the families of the chiefs on both sides, and it is even said that the Atalik-Ghazi afforded the Tungânis some military assistance against their Chinese enemies on the east.

However, about this time, viz., in the early summer of last year, the Russians appeared on the scene. Advancing between the two ranges (the Thiân-Shan and Altaï), they captured Kulja, an outlying province of the Tungâni kingdoms, but ruled by a Mussulman tribe of Turki extraction, called the Taranchis.

You will observe that Kulja lies on the north of the Thiân-Shan Range, almost opposite Aksu, an important city of Eastern Turkistân. A road here crosses the range, passing over a difficult glacier-pass, which is said to require the constant labour of forty men to keep it open for horse traffic by roughing the surface of the ice.

Between Kulja and the cities of Zungaria, however, there intervene only comparatively low hills, such that carts constantly perform the journey. This position thus affords an easy access from the Russian provinces into Eastern Turkistan, by turning the flank of the Thiân-Shan Range, which further west interposes its snows and glaciers between the two regions.

The Tungânis are, therefore, so unfortunately placed as to lie on the easiest route from Western Siberia towards both China and Eastern Turkistan. We may, therefore, fairly assume that this warlike people will soon have to deal with a far more formidable neighbour than Mahamad Yakub, the Atalik-Ghâzi of Kâshghar and Yârkand; and it is this which gives present interest to these ancient regions.

This potentate, who was engaged in pacifying and organising his recently acquired dominions of Turfân when the news of the Russian advance reached him, lost no time in retracing his steps to Aksu, where, near the mouth of the direct passage from Kulja, he established himself for some months with his forces.

This is now the second time that he has been recalled from his easterly conquests by the movements of the Russians on his

northern frontier. It has since been rumoured that he has lost Turfân, but this rumour is not, I believe, confirmed.

I have given a sketch of these recent transactions, for the purpose of elucidating the political geography of this region. What with the annual additions to our knowledge of its physical features, and the continued changes of frontier wrought by the decay of the Chinese empire, the progress of the Russian, and the birth of ephemeral native States between the two, the map-makers must have a hard task of it. Theories of physical geography are daily being brought to the test of experience, unexplored regions are being wiped off the map, and the "unchangeable East" now requires constant attention to record its alterations.

These districts are not devoid of natural advantages. Turfân produces the finest goats'-wool in the world, compared with which the wool of Tibet is coarse and cheap. Cashmir monopolises the Turfân wool for its shawls, and it is only under recent treaties that any of it has been allowed to reach India. It has probably never been seen in Europe in its unmanufactured state.

The same hills are rich in minerals, a great part of the copper coinage of Western China being derived thence. Nor is the still more valuable mineral, *coal*, wanting. My friend Doctor Henderson, who on our last journey to Yârkand directed his attention to geology and natural history, brought back with him several fossils from the hills skirting Yârkand on the south. These fossils were recognised as belonging to the coal-measures, and it was judged, from the dip of the strata in which they were found, that coal deposits might probably exist under the plains of Yârkand. Strange to say, while these conclusions were being arrived at in England, I was obtaining native information up in Ladâk, which confirmed them. I was assured that a black substance, called by the Turkis "tash-kümür," or "stone-charcoal," was found in the hills above Turfân, and used as fuel by the inhabitants.

Such a discovery would probably render the northern dependencies of the Atalik-Ghâzi more valuable than even the gold-fields and silk-producing districts of his southern province of Khotan.

While noticing these latest extensions of the Mahomedan Power in Central Asia, I may, perhaps, be allowed to refer to a misconception on the subject which has found expression in England. It has been suggested that the Atalik-Ghâzi's kingdom may present a danger to the peace of our frontier, and may excite the Mussulman populations of India.

I think, however, it will be agreed, by all who have studied the subject, that the sight of these neighbouring Mussulman Powers,

Afghanistân, Bokhâra, Yârkand, whose orthodoxy is unquestioned, voluntarily seeking our friendship and sending periodical embassies to the Court of the Viceroy, cannot fail to strengthen our influence among our Indian subjects of the same religion, and to counteract the preaching of the Wahabi fanatics, by showing that England is a friend to Islam all over Asia.

As for frontier quarrels, the desert plateaux, 18,000 and 19,000 feet above the sea-level, interpose too efficient a barrier to leave any fear of such disturbances.

It may interest this Society more to know that our relations with the Atalik-Ghâzi promise further facilities for geographical research in Eastern Turkistân. His Envoy last year came down through Ladâk, with complimentary letters for the Viceroy and the Queen, and after visiting Calcutta, where he had several interviews with the late Lord Mayo, and Delhi, where he was impressed by the sight of our European and native troops assembled together at the Camp of Exercise, he started back in April for his own country. At his parting interview with the Lieutenant-Governor of the Panjab, he made a formal request that his visit to India might be returned by the despatch of a British official on a friendly mission to the Court of his King. Renewed opportunities are thus likely to offer for the gratification of our legitimate desire to enlarge the bounds of our knowledge in those regions, where no prejudice seems any longer to close the way against moderate and judicious explorations.

General STRACHEY said he was glad to find that the explorations which had been made during recent years had altogether confirmed the conclusions arrived at by him twenty years ago. In the 'Journal' of the Society would be found papers in which he and his brother had sketched out very much the same general view as had just been more fully explained by Mr. Shaw, as to the general unity of the great mass of mountains that existed between India and Central Asia. There could be no question that the country from Western China to near the Caspian was in reality one great protuberance above the earth's surface, broken up in a very remarkable way, but wonderfully uniform in character throughout its whole length. The general characteristics of the mountain tracts on the northern border of the mass were very similar to those of the Himalayan portion, which was sufficiently well known. The results of Mr. Shaw's explorations into Yarkand proved that these characteristics continued for a certain breadth, and then the mountains ceased, and were succeeded by a comparative plain at a lower level. The geological formation of this mountain-mass, so far as it was known, indicating structural uniformity from the extreme end of Assam to the borders of Affghanistan, was a strong argument in favour of physical continuity. There was a great deal that was misleading in the manner in which geographers were in the habit of describing mountains; and the expression "mountain-range," as used by Humboldt, amongst others, was extremely vague. He agreed with Mr. Shaw that, in reality, the Himalayas and the Kuen Luen were nothing more than the southern and northern borders of the same mass of elevated land,

—the Bolor representing its western termination, while the Thian Shan was the accepted name of the mountain-mass which ran across the northern part of Central Asia; but there was certainly no special range, in the sense in which the word was commonly used, as implying an elevated mass with an equal ascent and descent on either side, which could properly be designated as Himalaya, Kuen Luen, Bolor, &c. From the plains of India (1000 feet) there was a rise of 15,000 or 16,000 feet, then a broad space with an average elevation of perhaps 13,000 or 14,000 feet, and then a fall on the opposite side to 6000 feet or lower. The whole interval being occupied by a mass of mountains; but there was nothing at all resembling what was commonly understood by a mountain-range.

Mr. SAUNDERS expressed his regret at having to differ from the views expresed in the paper. Mr. Shaw wished to obliterate the Kuen Luen, but that involved the question of what was a mountain-chain. From the plains of the Ganges the Himalaya could be seen rising, snow-capped, to an immense height. Was that a mountain-chain? On the other side, the plains were certainly not quite so low, but still they only had an altitude of 2000 to 4000 feet above the sea, while those of the Ganges rose to 700 and 1000 feet. On the west, the Kuen Luen Mountains were almost as high as those seen from the Ganges, rising 20,000 feet and upwards, while at the eastern extremity the elevations were equally high. Was not the Kuen Luen, then, a range of mountains as much as those seen from the valley of the Ganges? He did not deny that they were parts of the same elevated mass, but, as that mass had a breadth of 600 miles, it was desirable to distinguish its different parts by distinct names. It would be very much better still to recognise the range of the Himalaya in the culminating summits of the mass rising from the Ganges and Lower Indus, and limited on the north by the Upper Indus and the Sanpu; while we regarded as another range the culminating summits rising from the plains of Lake Lob. He was prepared to accept in its breadth the conclusion at which Humboldt arrived with regard to the structure of Central Asia. What was wanted was a better knowledge of the details. One great mountain-belt surrounded the plains of Central Asia, descending to the Arctic Ocean on the north, to the Pacific on the east, the Indian Ocean on the south, and the plains of Western Asia and Europe on the west. It was now known that this belt expanded into one vast plateau between India and the plains of Ili and Mongolia, or between the Himalaya and Kuen Luen Mountains; rising to 17,000 feet in the plains, and to altitudes of 29,000 feet in the summits. He had no doubt that the space between the Thian Shan on the south and the Altai on the north presented a similar plateau, though perhaps not so elevated; the Thian Shan bounding it towards the interior, as the Kuen Luen bounded the other plateau towards the interior, and the Altai Mountains performing the same function towards the Arctic Ocean as the Himalaya did for the other plateau towards the Indian Ocean. He also contended for a distinct application of the name Karakorum Mountains. It might be very true that the slopes over the Karakorum Mountains were easy, and the traveller was hardly conscious of passing a range of mountains; but that was nothing new. The rise from the valley of the Saskatchewan to the summit of the Rocky Mountains was, on one route, by a cart-road up an easy slope, and the traveller was only conscious of being on the top of the mountains when he commenced the descent on the other side by a steep escarp. So, in the plateau of Central Asia, the ascent from the plateau to the summit of the Karakorum may be very slight, and that the elevation of the Karakorum above the valley of the Indus was not to be compared with that of the Himalaya above the valley of the Ganges; but still the Karakorum water-parting performed a distinct function, separating the basin of the Indus from that of the Tarim. What was that water-parting to be called?—Should it not be regarded

as a range, when its summits reached an elevation of 28,000 feet?* He trusted that the day was coming when political restrictions would be so far removed, that the geography of the Himalaya might become as well known as that of the Alps.

Mr. F. DREW said the difference between the views expressed by Mr. Shaw and those stated by Mr. Saunders appeared to be chiefly a question of words, and to resolve itself into what was to be considered a mountain-range, and what was not. From the plains of India to the first range of the Himalayas at Cashmere the ascent was 15,000 feet, while the descent was to 5000 feet. That was distinctly called a mountain-range. The next ascent was to 15,000 feet or 18,000 feet, and the descent to 11,000 feet. That was also recognised as a mountain-range. Further on the valleys became higher, and the difference between them and the hills became gradually less, until it resembled one general mass. The best way of deciding the matter would be to make a vertical section right through.

The PRESIDENT said the vertical section would, of course, vary according to the point at which it was taken: one of the most interesting points of Mr. Shaw's discovery showed how the range filed off to the eastward. A vertical section from Yarkand to Lahore would differ greatly from one between Lhassa and Benares. The relative heights of the parallel chains varied considerably in different parts of the great chain. The essential improvement in our present knowledge of the physical geography of Central Asia over that of the time of Humboldt was, that the continuity of the Pamir with the Himalayas had been established. The whole range of mountains, from the Himalayas and the Pamir to the Caspian, were now proved to be continuous, running in a direction more or less north-west and south-east, instead of there being two chains connected by an unnatural transverse ridge, which was Humboldt's favourite theory. The true view originated with the Stracheys amongst modern geographers, but it was well known among Oriental geographers from the earliest times. Mr. Shaw's statement with regard to coal was very interesting. The Russians were actually using coal found in the hills to the north of the Jaxartes, and the steamers on that river derived their supply from the mines in the neighbourhood. If coal should ever be obtained near Thibet, it would be of enormous importance. The reason why that country was uninhabited, and almost inaccessible, was the entire absence of fuel. The occupation of Kulja by the Russians was declared by them to be merely temporary; they had recovered them from the Chinese rebels, and held them in charge until relieved by the Chinese Government. This was the recognised political status up to the present time. The Chinese Government had not relieved them of the charge, and so the Russians remained. Of course Kashgar and Yarkand were in the same position with regard to China as Kulja was, and could be recovered in a similar manner; only the Chief of Kulja was not quite so independent as the Atalik-Ghâzi. This gave a great interest to those countries, for through them Russia and England must ultimately be brought into contact. It was a law of nature, and must happen. The great object should therefore be, so to conduct relations between the two great empires, that when the contact took place it should not be in the form of a collision, but as an ordinary approach of civilized nations; and under those circumstances, he did not himself apprehend any danger.

* This attempt to curtail the nomenclature of the Central Asian Mountains, at a time when our knowledge of their details is rapidly increasing, is in concurrence with the views of the Russian geologist Severtsof, whose opinions on the subject appear to be too exclusively geological to be adopted in systematic geography. See Severtsof's paper in the 'Journal of the Royal Geographical Society,' vol. xl., which, while deserving of eulogium for the information it conveys, demands criticism to counteract the influence which it seems to be exercising.—[T. SAUNDERS]

LIVINGSTONE SEARCH AND RELIEF EXPEDITION.

The PRESIDENT said that this being the last ordinary meeting of the Session, he thought it right to communicate the latest intelligence received concerning Dr. Livingstone. On the 12th inst., two days after the last meeting, he received a telegram from the Governor of Bombay; but, though given in considerable detail, it was, to a certain extent, unintelligible and unsatisfactory. It was to the following effect:—

Copy of Telegram from the GOVERNOR OF BOMBAY *to Major-General Sir* HENRY RAWLINSON.

"12th June, 1872.

"Information about Livingstone from Arab sources shows him well Stanley at Ugogo, coming to coast with Livingstone's letters. It appears Livingstone traversed north end of Tanganyika, on his way from Manyema to Ujiji, where, obtaining stores, he returned to Unyanyembe. He refuses to leave the country, intending to explore underground path between Unyanyembe and Nyassa. It is affirmed River Rusiji flows into Tanganyika; hence Tanganyika is not connected with the Nile. Dawson retires, as there is no difficulty in sending goods to Unyanyembe; but Livingstone's son accompanies stores. Kirk crosses to Bagamoyo to push matters on.

"GOVERNOR OF BOMBAY."

That must have been brought to Bombay by a vessel direct from Zanzibar. The next day, further telegrams were received from Aden. It appeared that, ten or twelve days after the ship had left Zanzibar for Bombay, H.M.S *Wolverine* left Zanzibar for Aden, and on arriving at that place her commander, Captain Wratislaw, immediately telegraphed to the Admiralty, "Dawson and party returned to Zanzibar"—that was, from the mainland where they had been to forward the stores—"Mr. Stanley having arrived with despatches from Livingstone, alive and well." There were two or three interesting geographical queries connected with this intelligence. First, What was meant by the waters running into the lake? Did it imply that all the waters which Livingstone had been following up from the south, ran into the lake by the Rusizi channel? In connection with this, it must be remembered that, in a previous telegram, Lieut. Dawson stated that the Nile question was settled. The second question was, Where was the underground passage which Livingstone was about to examine? The telegram said it was between Unyanyembe and Nyassa. In a letter written some three years ago, Livingstone alluded to this underground passage as existing at a place called Rua. There were certain Mountains of Rua to the south-west of Tanganyika, and it had been hitherto supposed that the underground passage was there; but that position would not be between Unyanyembe and Nyassa, nor would it coincide with the information obtained by Colonel Grant, that the underground passage was crossed by caravans proceeding from Unyanyembe to Marungu at the southern end of the lake. The whole matter was so complicated, that he would not risk his geographical reputation in any attempt at explanation.

Lieutenant-Colonel J. A. GRANT, C.B., said that, when travelling through the Nubian Desert, he passed through a country of valleys completely walled round by escarped rocks, about 200 feet high. He asked one of his men if he had ever seen such an extraordinary country before, and the answer was, "Yes, I have seen it far, far away. I travelled with an Arab for ivory, from Unyanyembe down to the south of the Tanganyika Lake, to the country of Marungu: and down there there is an extraordinary quantity of water, and there are similar rocks to these, and a great river flowing east and west." When asked how the natives crossed the river, he said the sides were so steep

that no boats could find a landing-place, and every one who wished to pass had to go through a tunnel about 400 yards wide, and so long that his caravan took from sunrise till noon to pass through it. He described it as being about 20 feet high. No water passed through this tunnel; but, when the people wanted water, they dug in the sand for it. The rocks looked, he said, as if they had been planed by the hand of God—not rough, but flat. From that description, Sir Henry Rawlinson thought they might be slate, though he (Colonel Grant) had fancied they were basalt. In 1868, when Livingstone wrote home mentioning his Rua, it was found that, to the south-west of Tanganyika, Speke had written on his map a country called "Uruwa," and between Unyanyembe and Marungu he had marked a lake "Rukwa." He suspected that this "Rukwa" would turn out to be the same as Rua, the underground passage. He believed that Livingstone had been zigzagging up the western shore of Tanganyika, had gone round the north of the lake, had then come down across the Malagarazi River, where Burton and Speke were, and had then proceeded to Unyanyembe, where he would find three years' stores for him. Here he had met Mr. Stanley, but, of course, would not think of returning to England without determining the true course of the waters of the lake. After staying a short time at Unyanyembe, he would, no doubt, complete the circuit of Tanganyika by proceeding to its southern extremity, and thus solve the problem as to whether the waters flowed into the lake or out of it. The water of the lake was perfectly fresh, and the shells found there—deposited in the British Museum—were totally different from those of Victoria Nyanza and Lake Nyassa. He hoped that, after thoroughly examining Tanganyika, Livingstone would next direct his attention to the Victoria Nyanza and the Albert Nyanza, and make his way home *viâ* Egypt.

Mr. A. G. FINDLAY said, when Burton and Speke reached Kazeh, in 1857, Captain Speke sent home word that he had broken his last thermometer, and was dependent for observations on a bath-thermometer in a wooden case; consequently some doubt must be placed on his subsequent elevations. Ujiji was registered as 1800 feet above the sea, Unyanyembe being 3400 feet. Tanganyika was thus placed so low, that it was unreasonable to suppose it could go either to the Congo or to Nyassa. This fact was known to Livingstone previous to setting out on his last expedition; and, when the rumour of his death was circulated, he (Mr. Findlay) drew up a paper, in which he surmised that Speke's elevation of Tanganyika was 1000 feet too low, and that the correct elevation was 2800 feet, the same as Baker's Lake Albert. After that, Livingstone sent home intelligence to the effect that the river ran into the Lake of Tanganyika, and was 2800 feet. Thereupon he (Mr. Findlay) inferred that the whole of those waters ran into the Nile; and he still felt justified in that inference, though, of course, if the figures were wrong, the argument would be valueless. With regard to Speke's observations, he considered there was never a more trustworthy map drawn up than the one brought home by Captain Speke.

Mr. DANBY SEYMOUR wished to know what instructions had been sent to Lieutenant Dawson with regard to his future proceedings. If he returned home without accomplishing anything, it would be highly unsatisfactory to the public; and a discredit to the Government, if it was to be attributed to their influence, as had been rumoured.

The Rev. HORACE WALLER thought he would be a bold man who, with the scanty materials at hand, attempted to sketch out a new lake-region in the interior of Africa. It appeared to him that Livingstone was not only determined to clear up the question of Tanganyika and Nyanza forming a co-partnership, but also to ascertain the relations of the junior partner which came from the south-west. The east coast of Africa was at present very little known,

and it might be that the waters of a very large river flowed away to the east, and were lost in a delta similar to that of the Zambesi. With regard to the underground passage, Livingstone had already seen, at the Victoria Falls of the Zambesi, what in America would be called a vast cañon, and it was very possible that a similar phenomenon had given rise to the notion of the underground tunnel. The word Rua was well known. The name was applied to an affluent of the Shiré River. The natives were addicted to giving one name to similar pieces of water. A lake was always a Nyanza, or Nyassa, or something of the kind, while an island in a lake was always Chirowa or Kirua. Therefore a river running through a deep chasm might be called a Rua. All they could do was to wait patiently for the despatches which Mr. Stanley had brought from Livingstone. It could not be wondered at that he had objected to return to England. He was not the servant of the Society or of the Government, but worked for a higher Master. He was fifty-eight years of age; and, if he left Africa now and returned home he would be compelled to write a book, of which he had a great horror, and by the time he had completed that he would be too exhausted to return to Africa. To find a water communication between the interior and the coast had for years been the ruling desire with the Doctor. It was mainly in the hopes of finding a second outlet at the north of Lake Nyassa, and quite contrary to the conclusions of geographers, that he had embarked in his present task. All might feel sure that he would spare no exertions to find whether such a facility for opening the country existed in the course of a large river draining the waters of Tanganyika to the east coast.

The PRESIDENT said, in two or three days they expected the despatches from Mr. Stanley, and, if received in time, it was proposed to hold an Extraordinary Meeting of the Society for the purpose of hearing those despatches read. In conclusion, he proposed that a special vote of thanks should be passed to the Chancellor and Senate of the University of London, for the permission granted to the Society to hold their meetings in that hall; which was unanimously agreed to.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Documents relating to the Livingstone Search and Relief Expedition.**

ABOUT a month after the termination of the Session of the Society, namely, on the 26th July, Lieutenant Henn and Mr. W. O. Livingstone, Members of the Livingstone Search and Relief Expedition, arrived in London from Zanzibar, and presented to the Secretary the Report of Lieutenant Dawson on the Abandonment of the Expedition, and their own Reports relating to the brief period during which the Expedition was successively under their charge. In consequence of this, a meeting of the Livingstone Search and Relief Committee was called on the 29th July. The following Circular to the Subscribers to the Fund, in which the Reports just mentioned were printed, was agreed to by the Committee, and issued shortly afterwards:—

* The previous reports and announcements relating to this subject are contained in the present volume of the 'Proceedings,' pp. 124, 145, 158, 184, 203, 225, 241, 369, 375, 376, 379, 410.

First Report to the Subscribers by the Livingstone Search and Relief Committee.

The Livingstone Search and Relief Committee of the Royal Geographical Society herewith submit, for the information of the subscribers to the Expeditionary Fund, the Reports of the Leader and other Members of the Expedition, detailing their proceedings, and the motives which led them to abandon the undertaking when on the point of starting for the interior; adding thereto the Instructions furnished to the Leader of the Expedition, and a statement of expenditure.

The Committee think it will be useful to preface these Reports by a recapitulation of the communications received from the great traveller in the course of his present exploration, and of the state of affairs regarding him, as far as it was known, at the time when the Expedition was first projected by the Council of the Royal Geographical Society, on the 11th December, 1871.

Dr. Livingstone's present Expedition originated in a proposal, made to him in the spring of 1865, by the late President of the Society, Sir Roderick Murchison, to "explore the watershed of Inner Southern Africa." The Government was asked to assist, and contributed a sum of 500*l*., besides creating a Consulship for the traveller to the Chiefs of Inner Africa. The Council of the Royal Geographical Society subscribed 500*l*., and some subscriptions were obtained afterwards in Bombay; but these sums were probably far from sufficient to defray the costs of the equipment of the Expedition, which was on a large scale.

Livingstone left England in August, 1865, spent the winter in Bombay, and entered Africa, by Mikindany Bay, early in May, 1866. He sent a Report from Ngomano, on the Rovuma River, in that month; but after that date, no direct news was received from him until he wrote from Bemba, in the far interior, on the 1st of February, 1867. In the interval, whilst passing the southern end of Lake Nyassa, he was deserted by a large portion of his party, the notorious Johanna men, who escaped to the coast, and invented the lying report of the traveller's murder by the Mazitu. When the news of this supposed disaster, which was believed in by the authorities at Zanzibar, reached England, it was discredited, as is well known, by Sir Roderick Murchison; and a Search Expedition, *viâ* the Zambesi to the southern end of Lake Nyassa, was organized by Her Majesty's Government, at the solicitation of the Royal Geographical Society—an expedition which was carried out with surprising celerity and success by Mr. E. D. Young (August to December, 1867), who obtained on the spot ample evidence that Livingstone had passed on to the far interior in perfect safety.

It is one of the most singular circumstances connected with the prolonged and eventful journey in which Dr. Livingstone is now engaged, that, notwithstanding the decisive contradiction of his death brought by Young's Expedition, and the numerous letters received long after the supposed event from Livingstone himself, a doubt of the great traveller's being alive was still entertained by a large portion of the public. In truth no grounds arose, in the shape of native rumour or otherwise, subsequent to this event, for suspecting that his death had occurred.

As already stated, Livingstone's next letters were dated from Bemba, on the 1st February, 1867, before which time nearly all his escort had deserted him. He subsequently wrote from Cazembe's Town in December, 1867, from Lake Bangweolo on the 8th July, 1868, and from Ujiji on the 30th May, 1869. After the last mentioned date his communications with the outer world were again interrupted, and the anxiety of the Royal Geographical Society and of the public generally was again excited. This anxiety

led to attempts being made to reach him and convey supplies to him, in the far-distant region where he was supposed to be still travelling, west of Lake Tanganyika.

Already in February, 1867, Livingstone had written to the Consul at Zanzibar for supplies, to be sent to await him at Ujiji. These supplies were almost immediately forwarded *viâ* Kilwa, by Dr. Seward, who then occupied that post. Subsequently, about June, 1868, Mr. Churchill, who had in the mean time been appointed Consul, sent another caravan of stores, which duly arrived at Ujiji; and again, early in 1870, Dr. Kirk, who was at that time acting as Consul, in the absence of Mr. Churchill (in England), sent an ample supply of medicines, goods, and men, under the charge of Sherif bin Ahmed. This last caravan had reached Ujiji by November, 1870, and its leader had held communication with Dr. Livingstone (who was at Manyema), and had forwarded to him stores, medicine, and twelve men, as reported in a letter Sherif sent to Dr. Kirk, and which was published in the 'Proceedings of the Royal Geographical Society,' vol. xv. p. 206. Dr. Livingstone has since complained that most of these stores were plundered by the natives in charge; but the arrival of the twelve men enabled him to push his explorations to the farthest point, towards the north-west, he has yet attained, although the bad conduct of the men forced him to return before he had finished.

In the latter part of 1869 the cholera broke out at Zanzibar and on the opposite mainland, and greatly impeded communications with the interior. A further caravan with supplies sent up by Dr. Kirk, in October of this year, failed to reach Ujiji; seven of the men died of the epidemic, and the remainder, by the advice of the Governor of Unyanyembe, drew upon the supplies of which they were the bearers, for their subsistence. The residue of these supplies, and the stores presently to be mentioned as sent by Mr. Churchill in November, 1870, were found by the traveller in Unyanyembe (to which place he was forced to return, at great loss of time, to recover them) in February 1872; and they are stated to have furnished him with ample means, as far as goods were concerned, for continuing his explorations.

The supplies up to this date (1869) are supposed to have been provided out of Livingstone's own resources. It was on this account, chiefly, that Sir Roderick Murchison and the Council of the Royal Geographical Society, on March 31st, 1870, memorialized Lord Clarendon, as Her Majesty's Secretary of State for Foreign Affairs, setting forth the destitute condition in which it was inferred Dr. Livingstone then was, and praying the Government to send him assistance. A refusal was returned by the Foreign Office to this request; but a second memorial to the same effect, on May 7th, was considered by a Cabinet Council, and a grant of 1000*l.* was made for the object stated. In his letter to Sir Roderick, dated May 19th, published in the 'Proceedings of the Royal Geographical Society,' vol. xiv. p. 276, Lord Clarendon stated that Her Majesty's Government had granted this sum "at the request of Sir Roderick Murchison," and for the purpose of enabling Dr. Livingstone to complete his researches and return home.

The question was then considered, how best to convey this succour to the traveller? And at the meeting of the 13th June, 1870, Sir Roderick announced to the Society that no Expedition would be sent from England to take out supplies, as he believed the arrival of an unacclimatized gentleman would give trouble to the Doctor; but that Mr. Churchill, the Consul, being then in England and about to return to Zanzibar, would take out the money and instruct Dr. Kirk to send the required aid into the interior.

On the 18th November, 1870, Mr. Consul Churchill despatched the first instalment of supplies purchased with the Government Grant. This caravan remained in idleness at Bagamoyo, on the coast, until February, 1871, when Dr. Kirk (Mr. Churchill having finally left Zanzibar), hearing of the delay,

crossed over and caused the men to start for the interior ('Proceedings of the Royal Geographical Society,' vol. xv. p. 207).

In the month of February, 1871, Mr. Stanley, whose success in pushing his way to Dr. Livingstone is now so well known, left Zanzibar for the interior, without disclosing his plans to Dr. Kirk, according to a letter addressed by the latter to the President of the Society, dated September 25, 1871 ('Proceedings of the Royal Geographical Society,' vol. xvi. p. 103). In the same communication, however, Dr. Kirk states that he sent letters for Dr. Livingstone, under Mr. Stanley's care, and placed supplies for the missing traveller in his hands. On reaching Unyanyembe, Mr. Stanley and his party became involved in a war between the Arab traders and the natives; and Dr. Kirk, in his despatch to Earl Granville of the same date as the letter quoted above, reported that these disturbances would cause the road to Ujiji to be closed for a time, and that when we might hear again of Dr. Livingstone was most uncertain. Mr. Stanley was also reported to be weak and ill from fever, and to have lost four of his men ('Proceedings of the Royal Geographical Society,' vol. xvi. p. 103).

These letters reached England in November, 1871, and the state of affairs they disclosed regarding the prospects of hearing from or relieving Livingstone was so serious, that the Council of the Royal Geographical Society, under their new President, Sir Henry Rawlinson, determined to make an energetic effort to find and relieve Livingstone by means of an Expedition sent from England. This determination was arrived at, as already stated, on the 11th of December, 1871. In January, 1872, a Circular * was issued inviting subscriptions from the public, the Society heading the list with the sum of 500*l.*; and in a few days a sufficient sum was obtained to justify the Council in appointing a leader and preparing the outfit. The Government declined to make a grant in aid of the Expedition; but the Foreign Office made over to the Fund the balance remaining in Zanzibar (557*l.*) of the before-mentioned grant of 1870. It was esteemed a fortunate circumstance that at this juncture a trading steamer, the *Abydos*, was about leaving direct for Zanzibar, *viâ* the Suez Canal, which would enable the party to reach the East Coast many weeks earlier than would have been possible by the ordinary route to Zanzibar *viâ* the Cape. The party, as finally

* The Circular referred to was in the following terms:—

"*Livingstone Search and Relief Expedition.*

"The Royal Geographical Society, having been identified for the last twenty years with the explorations of Dr. Livingstone in Southern and Eastern Africa, recognize it as a duty, which they owe both to the great traveller himself and to the public at large, to make every effort to penetrate the darkness in which his later movements and his present condition are involved, and if possible to restore him to his anxious country.

"It is now two years and seven months since a scrap of writing has reached the coast from Dr. Livingstone, though he is believed to be residing at the distance of only a few hundred miles in the interior. He may be detained in captivity; or he may be prostrated by sickness, the recent attempts to convey supplies to him having failed to produce any direct news from the traveller himself. The suspense in which his friends have been kept with regard to him has, on these accounts, become intolerable, and requires to be terminated at all costs and hazards.

"The Council of the Royal Geographical Society, therefore, having learnt that a favourable opportunity unexpectedly occurs of communicating with Zanzibar, by a steamer which is to sail direct for that island *viâ* the Suez Canal, at the end of this month, intend to despatch an Expedition by her, if sufficient funds can be collected in time, and, if not, by the next opportunity. The Expedition will have instructions to proceed at once into the interior, after consultation with Dr. Kirk, Her Majesty's Consul at Zanzibar, as to the precise route most advisable at the time when it arrives, and to make its way to Lake Tanganyika, and ascertain on

organized, consisted of Lieut. Llewellyn Dawson, R.N., as leader, Lieut. W. Henn, as second in command, and Mr. W. O. Livingstone, son of the traveller. Lieut. Dawson had authority to engage also, should he meet with him, the Rev. Charles New, a missionary at Mombaz, who was understood to be preparing to return home, and who had previously distinguished himself by a successful journey in the interior, to the summit of Mount Kilimanjaro. The party left England on the 9th of February, well equipped, and with a fund, besides, of 2000*l.* to draw upon at Zanzibar for the further requirements of the Expedition.

The Expedition arrived at Zanzibar on the 17th of March. After completing their preparations, engaging a native escort and gang of porters, and purchasing goods for their own and Dr. Livingstone's wants, the party, increased by the addition of the Rev. Mr. New, who signed an agreement to act as third in command, crossed to Bagamoyo, on the mainland, on the 27th of April.

Up to this date, no further news of Dr. Livingstone or Mr. Stanley had reached the British Consulate at Zanzibar, and the obstruction of the direct route to Ujiji, caused by the native war, still continued. But on the 28th of April, the day following the landing of the Expedition at Bagamoyo, three native messengers, sent in advance of Mr. Stanley, arrived at that place, and announced that that gentleman had found Dr. Livingstone. Lieut. Dawson returned with these men to Zanzibar, and on the 3rd of May called a meeting of the members of the Expedition, at which he announced that the objects of the Search Expedition had been forestalled, and that it remained only to send supplies to Dr. Livingstone.

On these grounds, as will be seen by his Report, Lieut. Dawson, on May 6th, resigned the command into the hands of Lieut. Henn, who agreed to lead the relief caravan to Unyanyembe, where Dr. Livingstone was reported to have remained, after travelling so far towards the coast with Mr. Stanley. Mr. New also retired from the Expedition, on the plea that he could not serve as second in command to Lieut. Henn. Thereupon Lieut. Henn and Mr. W. O. Livingstone recrossed to Bagamoyo.

On the 7th of May Mr. Stanley himself arrived at that place, and having informed Lieut. Henn that Dr. Livingstone had found ample supplies awaiting him at Unyanyembe, that gentleman returned to Zanzibar, and on the 9th of May resigned his command into the hands of Mr. W. O. Livingstone, who took charge of all the property of the Expedition (still remaining at Bagamoyo with the porters and escort) with the intention of leading the caravan up to his father.

The Report of Mr. Livingstone will explain the complications which afterwards arose, and the reasons of his finally declining to proceed. Under his superintendence a portion of the stores was made over to Mr. Stanley, for the caravan he was preparing by Dr. Livingstone's orders, and the rest sold by auction in Zanzibar. The escort selected by Mr. Stanley was furnished with

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the spot the truth or falsehood of the rumours which have reached the coast with regard to Dr. Livingstone's residence at Manyema. The Acting Political Agent at Zanzibar will be instructed by Her Majesty's Government to afford every assistance to the Expedition; and, as the party will be started in the most efficient state, it is hoped that the whole work may be accomplished and the officers employed may return to England within the year.

"The Public is invited to co-operate with the Society in subscribing to the fund for the Livingstone Search and Relief Expedition. Subscriptions will be received by Messrs. Cocks, Biddulph & Co., Bankers, 43, Charing Cross; Messrs. Coutts & Co., Strand; Messrs. Ransom, Bouverie & Co., No. 1, Pall Mall East; and by the Accountant of the Society, No. 1, Savile Row, W.

"ROYAL GEOGRAPHICAL SOCIETY.. .. .. .. £500."

the carbines and ammunition supplied by the War Office, and the six Nassik boys who had been sent from Bombay for the English Expedition were added to the party, as part of the future escort of Dr. Livingstone.

Lieut. Dawson sailed for Europe, *viâ* the Cape of Good Hope, on the 21st of May. On the same day, Mr. Livingstone returned to Bagamoyo, and brought over the goods belonging to the Expedition, which were sold on the 26th and 28th of May; and on the 29th of May, Lieut. Henn and Mr. Livingstone, together with Mr. Stanley, left for Europe.

The statements of account hereto appended must be considered as only provisional; but the Committee may state that, after all outstanding liabilities are paid, there will remain a balance of about 450*l.* in the hands of the British Consul at Zanzibar, and about 3000*l.* in those of the Royal Geographical Society. The Committee believe it will be in accordance with the wishes of the subscribers to hold this sum (placed out at interest) in readiness for supplying Dr. Livingstone's further wants, in whatever form future events may prove most desirable. Meantime they have to state that the Relief Caravan sent up by Mr. Stanley was supplied out of the Expeditionary Fund, with goods and money to the amount of 1485 dollars (388*l.* 4*s.*); and that the wages and expenses of the six Nassik boys (22*l.* 10*s.* 6*d.*) were also paid out of the Fund.

The Committee, whilst deeply regretting the abrupt termination of an Expedition prepared with so much care and completeness, and so liberally furnished with means by the British public, abstain from pronouncing a final judgment on its conduct until the arrival of Lieut. Dawson in England.

1, Savile Row,
August 9th, 1872.

Instructions to Lieutenant Dawson.

To Lieutenant Llewellyn S. Dawson, R.N., from the President and Council of the Royal Geographical Society.

(Instructions.)

Sir,—We have selected you, from among many volunteers, as the leader of an Expedition to seek for Dr. Livingstone, to relieve his immediate wants, and to afford him means for returning to England.

The funds to defray the cost of this Expedition have been principally raised by public subscription under our initiative, and we place the sums mentioned in the Appendix to the credit of your Expedition, with the understanding that you may expend that amount, and no more; and that you shall transmit an account of your expenditure from time to time to the Society.

You have chosen, with our entire approval, to take with you Lieutenant William Henn and Mr. William Oswell Livingstone; but you must inform those gentlemen that we have placed the control of the Expedition and of the expenditure entirely in your hands, subject only to the Instructions contained in this paper.

We have seen and retain copies of your agreements with these gentlemen, and approve of them. If, therefore, any accident should incapacitate you from continuing in command, we shall consider the control and property of the Expedition to devolve upon Lieutenant Henn; and if he also should be incapacitated, then upon Mr. W. Oswell Livingstone.

You will proceed direct to Zanzibar by the *Abydos* steamer, which is expected to leave London on February 7th, *viâ* the Suez Canal.

On reaching Port Said, and again at Suez, you are to apply at the Post Office for letters and telegrams, as either ourselves, or H.M. Consul at Alex-

andria, may have important intelligence to communicate to you, respecting Sir Samuel Baker, of whose safety on October 22nd, at a distance of 20 miles north of Gondokoro, we have heard through the Foreign Office.

On arrival at Zanzibar, you will deliver to Dr. Kirk, Acting Consul and Political Agent at that place, a Letter of Instructions which has been addressed to him by the Foreign Office on the subject of your Expedition, and which enjoins him to give you all the advice and assistance in his power. You will also deliver to the Sultan of Zanzibar a Letter of Recommendation on your behalf given to us, for you, by Her Majesty's Secretary of State for Foreign Affairs, which will, no doubt, procure for you the good offices of His Highness with regard to the Governors and Native Chiefs of the interior.

According to the latest rumours received by us, Dr. Livingstone is residing at Manyema, a place distant some days' journey west of Lake Tanganyika; but you will probably find that Dr. Kirk possesses more recent information. You will, therefore, consult him as to the direction in which you are to search, the route you are to take at starting, and the character of your outfit.

It is impossible for us to foresee more than a few of many possible contingencies, we therefore limit our instructions to the three following cases, leaving to your judgment, if any others should arise, to act as you believe most conformable to the spirit of these Instructions:—

1. If Dr. Livingstone desires to return in your company at once, or after what you consider to be a moderate delay, you are to take him with you, showing that courteous regard to his comfort and wishes, and deference to his suggestions, which ought to be rendered to a person of his distinction and unparalleled experience in African travel.

2. If Dr. Livingstone should desire to remain longer in the country than seems fitting to you to wait for him, or if he should wish to return by a route different to that which you consider to be generally most advantageous, you are to assist him with such stores and supplies as you consider you can prudently spare, and you will leave Mr. W. Oswell Livingstone with him, if that gentleman should desire it. You are also to endeavour to procure from Dr. Livingstone, for transmission to the Royal Geographical Society, copies of the Geographical Information he has obtained during his present expedition, of which very little is known to us.

3. Should it be affirmed that Dr. Livingstone is no longer alive, you are to take every means in your power to verify the assertion, in order that no doubt may hereafter arise as to its truth or falsehood; and if, unhappily, the rumour should prove true, you are to strive to obtain possession of his papers and effects. Though the succour of Dr. Livingstone is the primary object of the Expedition, you will, no doubt, be able largely to add to our geographical knowledge of Africa, principally by mapping such parts of the country as come within your observation; and, if compatible with that primary object, you would do well to obtain numerous observations to fix the altitude above the sea-level of Lake Tanganyika, and of any other lakes you may visit, and their longitude by absolute determination.

You are to neglect no opportunity of communicating with us, and you are to transmit to the Royal Geographical Society, from time to time, abstracts of your journals and observations; and you are clearly to understand and promise that no account of the results of the journey is to be published by you before your papers are laid before the Royal Geographical Society, and permission given you by them to publish your narrative. You will also make this one of the terms of your agreement with the other members of your party.

It remains for us to assure you that we place great confidence in your discretion and perseverance, and that we fully recognise the high spirit and disinterestedness with which you have volunteered your services. We

cordially wish that yourself and your companions may have a prosperous journey, and we hope we may welcome you on your safe return in about a year or a year and a half from the present time.

Signed (on behalf of the Council)

H. C. RAWLINSON (President).

Accepted L. S. DAWSON.

APPENDIX.

	£
Sum granted for outfit of yourself and party (besides passage-money, presents for the Sultan and Native Chiefs, &c...	400
Sum placed to the credit of the Expedition at Zanzibar	2000

Lieutenant DAWSON's *Official Report.*

"SIR, "Zanzibar, May 19th, 1872.

"The Expedition under my command having been completed in equipment on Tuesday, April 23rd, a dhow was hired for transhipment of stores and guard for Bagamoyo, on the opposite coast; and, in company with Lieutenant Henn and Mr. New, I took my departure for that place on the 27th, leaving Mr. Livingstone at Zanzibar to complete some final preparations.

"Steps were at once taken to form a camp and prepare for ultimate departure for the interior.

"On the evening of the 28th (day of arrival at Bagamoyo), three men were brought to me who it was reported had just arrived from a whiteman's caravan with a letter for Zanzibar. On examination, this "msungu" or white-man proved to be Mr. Stanley, the correspondent of the 'New York Herald,' who had dispatched these men in advance from Ugogo to announce his safety, and that he had accomplished the objects of the duty with which he was entrusted, viz. the finding of Dr. Livingstone and his relief.

"I took dhow for Zanzibar the next morning, accompanied by these men, their leader being Umbari, one of Speke's faithfuls, and elicited from them that Mr. Stanley had found Dr. Livingstone at Ujiji after his return from Manyema, and had accompanied him on a journey along the border of the lake, returning in his company to Unyanyembe; that Dr. Livingstone was quite well, still took observations, had abundance of stores, and would wait at Unyanyembe for fifty men to be sent by Mr. Stanley from Zanzibar, in order to continue his explorations. Mr. Stanley himself being left at Ugogo seventeen days before, on his way to Zanzibar, with the remainder of his guard and Dr. Livingstone's letters.

"Under these circumstances, I recalled Lieutenant Henn and Mr. New from the coast; and on Friday, May 3rd, I called a meeting of the members of the Expedition, and laid before them what I had learned of Dr. Livingstone, pointing out that I considered the main objects of the Expedition had been forestalled, and nothing remained to be done but to forward such stores as Dr. Livingstone might still be in need of to Unyanyembe.

"Mr. Oswell Livingstone still persistently stated that it was his wish to go to his father, for private reasons which I will not here repeat. Having con-

sulted with Dr. Kirk, I concluded I should only be carrying out the wishes of the Royal Geographical Society in allowing him so to do, the heavy expense of the fit-out of the Expedition having been already incurred. Lieutenant Henn volunteered to accompany him, and take charge of the caravan and goods to Unyanyembe. I accordingly wrote him an official letter on the subject, a copy of which I enclose. As regarded myself, I felt that my presence in the country as a surveyor would be highly irritating to Dr. Livingstone. My instructions, more especially on the subject of the geography of the country, and to endeavour to procure from him copies of the geographical information he had obtained, would also, I considered, cause him annoyance, and probably utterly prevent his disclosing what his movements have been or may be for the future.

"I knew the route to Unyanyembe was well known geographically, and the Expedition having been formed for Dr. Livingstone's relief as well as search, I considered I should not be justified in taking the responsibility of striking out a new line of country with stores which, on Dr. Livingstone being heard of as alive and well, might now be considered his property. With bitter disappointment, I therefore gave up the idea of attempting to encroach on what Dr. Livingstone had gone so far with, and evidently intended to finish. Mr. New, also, under the altered circumstances of the Expedition, considering his services superfluous, withdrew; and on May 6th, Lieutenant Henn and Mr. Oswell Livingstone again left for Bagamoyo. Since that date, Mr. Stanley having arrived at Zanzibar with written instructions from Dr. Livingstone on the subject of his wants, appointing him his agent in all such matters, Lieutenant Henn very rightly, I considered, delivered the goods and outfit into the charge of Mr. Oswell Livingstone; but he will himself communicate with you on the matters of the Expedition from the day of my giving him charge of the stores, &c., for Unyanyembe.

"On a former occasion I forwarded a copy of Mr. New's agreement with me. He having since claimed a passage at the expense of the Royal Geographical Society, as laid down in that agreement, I acquainted him that, under the unforeseen circumstances, I could not take the responsibility of advancing him his passage-money, and that it would be a matter for the Council to decide and settle with the Missionary Society to which he belongs, as in making my agreement with him I had but acted as the agent of the Royal Geographical Society.

"Mr. Stanley is, I believe, in possession of Dr. Livingstone's correspondence, journals, &c., for England; but, declining to answer any question relating either to his own or Dr. Livingstone's travels, I can give no authentic information as to what the Geographic researches of either may have been. Dr. Livingstone may himself have communicated with you on this subject, and it will be more judicious on my part to withhold what I have learnt from Mr. Stanley's guard until that gentleman has himself made known and acted for Dr. Livingstone in whatever way he may have been instructed, what his discoveries may have been.

"Dr. Kirk has received much bulky correspondence from Dr. Livingstone, consisting chiefly of complaints against Hindees and Arabs resident here, who, I must in justice say, have proved my best friends in Zanzibar when fitting out the Expedition of the Royal Geographical Society for his relief, and without whose influence and aid my task would have been considerably heavier. No mention is made in these letters of what Dr. Livingstone has been doing, or intends to do; and if in Mr. Stanley he has found a firmer or more trusty friend than in Dr. Kirk, Mr. Stanley must be a friend indeed. I enclose a list of expenses incurred of the fit-out of the Expedition up to May 6th, when Lieutenant Henn took charge. They appear heavy in comparison with those of former Expeditions; but please let it be borne in mind that I provided for

four Europeans for a period of one year in Africa, with sufficient surplus of stores for the relief of a fifth, acting with all alacrity in the matter, having no cause to think that Mr. Stanley would have carried out his employer's purpose so efficiently and so well.

"The barque *Mary A. Way* leaves for New York *viâ* St. Helena on Tuesday, 21st. I have engaged a passage, bringing back the greater part of the instruments, and some of the watches supplied for presents. Lieutenant Henn will probably remain, and proceed to England *viâ* Bombay, arriving about the same date as this letter. I should have proceeded by the same route, but though I do not grudge Mr. Stanley his well-earned success, it would be distasteful to me, if not to both of us, to travel in company; and opportunities are but few from Zanzibar to Europe.

"Mr. Oswell Livingstone is now acting with Mr. Stanley in getting ready the supplies, men, &c., required by his father, and ordered by him through Mr. Stanley, and will, I believe, accompany them himself to Unyanyembe. I have advised the sale of the original outfit, and, with Dr. Kirk, distinctly pointed out to Mr. Oswell Livingstone that the Royal Geographical Society will still hold him responsible for an account of expenditure, and information as to his movements. Trusting that my endeavours to act for the best under what have become most delicate and complicated circumstances will have met with the approval of the Council, who selected me for the post I lately held as leader of an Expedition which promised so well, I cannot close without remarking that, rejoiced as I am at the safety and well-being of the great Traveller for whose search this Expedition was formed, I cannot but feel pained that he should have adopted the course of forwarding his documents and correspondence through an American agent, and jealously avoided making known what his recent discoveries may have been to his former friend and fellow-traveller, Dr. Kirk; such behaviour auguring but ill for what the reception of the Royal Geographical Society's Expedition would have been, had it fallen to us to carry out the purpose for which we individually volunteered.

"I have the honour to be, Sir,

"Your most obedient Servant,

"L. S. Dawson, Lieut. R.N.

"*The Secretary of the Royal Geographical Society.*"

Lieutenant Dawson's *Instructions to* Lieutenant Henn *on transferring the Command.*

"Sir, "British Consulate, Zanzibar, May 6th, 1872.

"Substantial information having arrived from Mr. Stanley that he has found Dr. Livingstone, and relieved his immediate wants, and that he (Dr. Livingstone) awaits supplies at Unyanyembe to continue his explorations, I consider that the objects of the Livingstone Search Expedition, as formerly organised by the Royal Geographical Society, have been forestalled, and nothing remains but to send the goods provided for the Expedition, and Dr. Livingstone's relief, to Kazeh as speedily as possible. Mr. Oswell Livingstone being desirous of joining his father at Unyanyembe, and understanding it is your wish to take charge of and conduct the caravan conveying the stores to Kazeh, I herewith make over to your charge native goods to the value of 3186 dollars, cloths for Pagazis to the value of 900 dollars, and all European ammunition, stores, and equipment, to be conveyed to Kazeh with the utmost despatch.

"It is distinctly to be understood that these goods are now for Dr. Livingstone's use, but you have power vested in you to retain what you consider a sufficient quantity to bring you back to the coast by whatever route you choose.

"Six months' wages has been paid to eighteen natives to act as guard, the Akhida (caravan leader) has received one year's pay in advance, and six Nassik boys two months' in advance. I herewith furnish you with copies of their agreements; and should Dr. Livingstone still wish to remain in the country after your meeting him, you are empowered to retain what you consider sufficient escort to conduct you to the coast.

"Two thousand seven hundred and fifty-eight dollars, eleven and a half cents (2758 dollars, 11½ cents) remain in the hands of H.M. Political Agent, to the credit of the former Expedition, from which you will be at liberty to draw, furnishing the Royal Geographical Society with an account of your expenditure. The instructions of the Royal Geographical Society still hold good in all detail as to information, letters of proceedings, &c.; and of these you retain a copy.

"I have the honour to be, Sir,

"Your most obedient Servant,

"L. S. DAWSON, Lieutenant R.N.

"*Lieut. W. Henn, R.N.*"

Lieutenant HENN'S *Instructions to* Mr. LIVINGSTONE *on transferring the Command.*

"SIR, "British Consulate, Zanzibar, 9th May, 1872.

"In consequence of the arrival from Unyanyembe of Mr. Stanley, with the intelligence that Dr. Livingstone is at that place, and is well supplied with stores, arms, and ammunition; that he has no intention of leaving Africa at present; that he has given Mr. Stanley an order to engage men and purchase stores, which are to be sent to him at once, and also an order to turn back any expedition he might meet proceeding to his assistance—

"I therefore consider that, as both objects of the original Expedition have been fulfilled, my services are no longer required; and as I understand it is your wish to join your father, I herewith resign command of the Relief Expedition, and make over to your charge all the goods, equipments, arms, ammunition, and instruments, which were purchased for his relief, including fifty artillery carbines, with their swords and accoutrements complete, lent by Her Majesty's War Department for the same purpose.

"There are native goods lying at Bagamoyo, in charge of Abdullah bin Ali, to the value of 3186 dollars, cloths for Pagazis to the value of 900 dollars, and there remains to your credit at Zanzibar the sum of two thousand six hundred and twenty dollars, eleven and a half cents, of which sum 859 dollars 11½ cents, part of the original Government grant, is in the hands of Dr. John Kirk, Her Majesty's Acting Political Agent, and the remaining sum of 1764 dollars is in the hands of Tania Topun.

"Six months' wages has been paid to nineteen natives to act as guard, and the Akhida (caravan leader) has received one year's pay in advance, and six Nassik boys two months' in advance. I herewith furnish you with copies of their agreements.

"You will be at liberty to draw on the funds remaining to the credit of the former Expedition, furnishing the Royal Geographical Society with an account of your expenditure. The instructions of the Royal Geographical Society will

still hold good in all details as to information, letters of proceedings, &c. Of these you have a copy.

"I have the honour to be, Sir,

"Your most obedient Servant,

"WILLIAM HENN, Lieutenant R.N.

"*Mr. W. O. Livingstone.*"

Lieutenant HENN'S *Official Report.*

"SIR, "British Consulate, Zanzibar, 10th May, 1872.

"I have the honour to inform you that, in consequence of reliable information having been received that Dr. Livingstone had been found by Mr. H. M. Stanley, the correspondent of the 'New York Herald,' and was now at Unyanyembe, a meeting of the members of the Expedition was held, at which Lieut. Dawson announced that the principal object of the Expedition was forestalled, and that under these circumstances he did not consider that it was requisite for him to proceed into the interior.

"I then expressed my willingness to take charge of all the stores, equipment, &c., belonging to the Expedition, and convey them to Dr. Livingstone as speedily as possible; whereupon Lieutenant Dawson resigned, and officially made over to my charge everything belonging to the original Expedition for conveyance to Unyanyembe.

"Mr. Charles New and Mr. W. O. Livingstone agreed to accompany me: Mr. New as second in command, on the understanding that all dealings with natives were to be left in his hands. I also informed him that I should not require for my own use any notes he might make during the journey, but that everything was to be transmitted to the Royal Geographical Society, according to the original agreement.

"On the 4th May I received the annexed letter from Mr. New, in which he retires from the Expedition,* as he considers his services would now be superfluous; at the same time he addressed Dr. Kirk, Her Majesty's Acting Political Agent, informing him of the step he had taken, giving as a reason his inability to accept a second place under my command.† I then wrote to him and requested that he would return all the property belonging to the Expedition he had in his possession, and furnish me with an account of

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* "*To Lieutenant* HENN, R.N.

"MY DEAR HENN, "Shangani, May 4, 1872.

"I have come to the conclusion that I can no longer serve the Livingstone Search Expedition as effectually as I could desire—indeed, that my services are now superfluous—*and I beg to retire.*

"Anything I can do to help you at starting, in the collection of porters, &c., I will most readily do. I think you will find the Mombasa men manageable, and I will use what influence I may have with them to secure their adhesion to the Expedition.

"I wish you all manner of success—first, the achievement of the Expedition's main object, and then all else you can reasonably expect.

"I will send you what 'kit' I have belonging to the Expedition.

"Believe me to be, sincerely yours,

"CHAS. NEW.

"P.S.—I beg to be allowed to withdraw from the Expedition my own boy Tofiki. I will, of course, return the money advanced to him.—C. N.'

† See Appendix.

his personal expenses to that date, which account was duly settled by Lieut. Dawson.

"On the 6th May I proceeded with Mr. W. O. Livingstone to Bagamoyo, to engage Pagazis, or porters, and hasten the preparations for an early start. On the evening of the 7th May, Mr. Stanley and his party arrived at Bagamoyo from Unyanyembe. I then learned from him that Dr. Livingstone was at that place, alive and well, and had no intention of leaving Africa at present. Mr. Stanley had supplied him with stores, arms, and ammunition, besides which he was in possession of the stores sent to Unyanyembe by Dr. Kirk, sufficient to last him for several years. Mr. Stanley also informed me that he had orders from Dr. Livingstone to send him without delay fifty armed men, with some small supplies he was in need of, and also to turn back any Expedition he might meet on its way to relieve him.

"On receipt of this intelligence, I at once returned to Zanzibar, and, after mature deliberation, I considered that as both the objects of the Search and Relief Expedition were now fulfilled, I should not, under the circumstances, be justified in proceeding into the interior, and I therefore determined to wind up accounts, and send to Dr. Livingstone by his fifty armed men such supplies as he required; but on Mr. W. O. Livingstone still persisting in his wish to join his father, and expressing his willingness to take charge of all the stores purchased for his relief, I thereupon resigned and made over to his charge everything belonging to the Expedition.

"Trusting that my conduct will meet with the approbation of the Royal Geographical Society, I have only to add that, glad as I am to know of Dr. Livingstone's safety and well being, it is with feelings of deep regret and disappointment that I have felt myself obliged, owing to the foregoing circumstances, to relinquish my project, and to turn back when almost on the eve of starting. Had I been able to proceed, it was my intention, on leaving Unyanyembe, to return to the coast by an entirely different route, in the hope of acquiring some new geographical information.

"Since writing the above, Mr. W. O. Livingstone has returned from the coast, and, for reasons which he has not made known to me, has given up all idea of joining his father, and is now making arrangements with Mr. Stanley for sending him, by his armed party, such stores as he requires. On these subjects, however, he will himself communicate with you. I herewith append an account of the expenditure which took place during the time the Expedition was under my command,

"And have the honour to be, Sir,

"Your most obedient Servant,

"WILLIAM HENN, Lieut. R.N.

"*The Secretary of the Royal Geographical Society.*"

Mr. W. O. LIVINGSTONE'S *Official Report.*

"SIR, "Leytonstone, 27th July, 1872.

"I have the honour to inform you that Lieutenant Henn resigned command of the Livingstone Search Expedition 9th May, 1872, leaving it to me to proceed into the interior to join Dr. Livingstone, as specified in the Instructions of the Royal Geographical Society; and for this purpose Lieutenant Henn handed over to me all the goods and provisions bought for the Livingstone Search Expedition, with the arms, ammunition, instruments, &c., forming the outfit of that Expedition, and a sum of money amounting to 500*l.*

"On the 12th May, 1872, I proceeded to Bagamoyo, on the coast, where the goods of the Expedition were placed under a guard of twenty men hired for the Expedition; and, having made arrangements for a start into the interior, I returned to Zanzibar 15th May, 1872.

"At this time Mr. Stanley was at Zanzibar, having arrived from the interior with an order from Dr. Livingstone for fifty armed men to act as carriers, and a few extra provisions, the expenses of which were to be defrayed by drawing on the 500*l.* of Government Grant, which Dr. Livingstone supposed was still remaining for his use at Zanzibar; and as this money had been handed over to the Livingstone Search Expedition, I furnished Mr. Stanley with money to the amount of 240*l.*, together with such clothes and provisions as the men required for the journey, at the same time arming them with the fifty carbines which were supplied to the Expedition by the War Department. These men, along with my own twenty soldiers and the six Nassik boys, I intended to have led up the country to Dr. Livingstone, but at this point some unfortunate complications arose which prevented my carrying out this intention.

"After the resignation of Lieut. Henn, I had left in my hands goods bought for the Expedition, whose value amounted to 800*l.* On my telling Mr. Stanley that I intended to dispose of these before I started, he said that if I waited to do so he should be compelled to send the men off without me, as Dr. Livingstone had requested him not to allow of any delay in sending off the men. I then requested Dr. Kirk's advice; which was so strong against my entering the country during the continuance of a rainy season unequalled in severity, when Dr. Livingstone was in no actual need of me, that I at last determined to let the Expedition proceed without me. I need not mention what a disappointment this was to me.

"On the 21st May, I again proceeded to Bagamoyo, and brought over to Zanzibar the goods and men which were there, and, having dismissed the latter, I made arrangements for a sale of the goods, which took place on the 26th and 28th May. The amount of money I received was about 600*l.*, being a loss of about 30 per cent., which, on account of the depression in trade following the hurricane, was considered as being small. From this money I deducted my passage-money and other expenses, and placed the remaining sum of 450*l.* to the credit of the Royal Geographical Society in the hands of Her Majesty's Consul, Dr. Kirk, at Zanzibar. I will, however, furnish a supplement of the expenses of the Expedition while in my hands.

"As regards the Nassik boys, I offered to send them back to Bombay; but as they expressed a strong dislike to that place, as well as an earnest desire to go on to Dr. Livingstone, I sent them on with the other men. I cannot speak too highly of their conduct while in my charge.

"I must also express the gratitude which I feel to Dr. Kirk for his services to me while at Zanzibar. Always ready to give me advice, always ready to help me, or by his kindness to make me comfortable, I found him an invaluable friend, and I cannot sufficiently deplore the circumstances which have lately occurred tending to his prejudice.

"I also received much kindness from the other European residents at Zanzibar; and I must not forget to mention the assistance in money and other matters which I received from the Indian and native merchants.

"On the 29th May I started for Seychelles, where I was detained a month by losing the mail, and on 26th July I arrived in England.

"I have the honour to be, Sir,

"Your most humble Servant,

"W. Oswell Livingstone.

"*Maj.-Gen. Sir Henry Rawlinson, K.C.B., &c.,*
President of the Royal Geographical Society."

LIVINGSTONE SEARCH AND RELIEF EXPEDITION.

Account of Receipts and Expenditure in Zanzibar.

Receipts.	Dollars.	*Expenditure.*	Dollars.
Lieutenant Dawson's balance on arrival at Zanzibar	28·5	Pay of Natives employed	1691·05
Balance of Government Grant transferred by Dr. Kirk to Fund	2649·00	Goods purchased	4507·63
Amount realised by Bill in England	6000·00	Miscellaneous expenses at Zanzibar and passages home	2333·37
Ditto sale of Goods	4090·00	Pay of Men and Goods supplied to Mr. Stanley	1485·00
		Loss on Sale of Goods	600·00
		Balance in Dr. Kirk's hands	2150·00
	*$ 12,767·05		*$12,767·05

* Which, at 4*s.* 2½*d.* per dollar, equals £2686 8*s.*

LIVINGSTONE SEARCH AND RELIEF EXPEDITION.

Account of Receipts and Expenditure in England.

Receipts.	£.	s.	d.	£.	s.	d.
Subscriptions:—						
Received	4889	1	5			
Promised	296	3	0			
				5185	4	5
Balance of Government Grant transferred to the Fund	..			557	7	10
Half Year's Interest on £2500 Exchequer Bills	..			30	10	10
				£5773	3	1

Expenditure.	£.	s.	d.
Outfit, Passage Money, &c., for Lieutenant Dawson and Party	516	12	0
Instruments	163	12	5
Presents to Native Chiefs	158	14	3
Lieutenant Dawson's Draft on the Fund	1301	0	11
Advertising	142	2	9
Sundry small charges	18	13	5
Balance	3470	7	4
	£5773	3	1

6th August, 1872.

APPENDIX.

Agreement between Charles New and Llewellyn Styles Dawson, made at Zanzibar, Monday, March 25th, 1872.

I agree to give my gratuitous services in and to join the Livingstone Relief Expedition, as originally organized in England by the Royal Geographical Society, on the following understanding:—

(1). That, should accident incapacitate Lieutenant Dawson from continuing the command, I agree to consider Lieutenant William Henn the commander of the Expedition, and to act under him as such. Should he be incapacitated, I agree to take command, and use my best endeavours to carry out the objects of the Expedition, as laid down in the Instructions of the Royal Geographical Society.

(2). I promise not to publish any account of the proceedings or results of the Expedition in anticipation of Lieutenant Dawson, and to give him the benefit of any notes I may make after the Council of the Royal Geographical Society shall have been informed of those proceedings or results, in ample time to admit of their publication in the customary form in the 'Journal' of the Society.

(3). Should any difference of opinion arise during the journey as to the meaning of any portion of the printed instructions, a copy of which I have seen, I agree to abide by the interpretation Lieutenant Dawson may put upon them.

(4). That I am free from all personal expense as regards outfit, lodging food, &c., from the day I make this agreement, and that a passage to England will be found for me at the expense of the Royal Geographical Society on the return of the Expedition to Zanzibar.

Signed { L. S. Dawson, Commanding Expedition.
Chas. New.
Wm. Henn.
W. Oswell Livingstone.

Mr. New's Letters to Dr. Kirk.

"Dear Dr. Kirk, "Shangani, May 3rd, 1872.

"I would have accepted without hesitation the charge of the Expedition in the way you proposed in your note to me, but (as of course you are by this time aware) Mr. Henn does not wish to give up. Now I do not wish to struggle for the position with Mr. Henn. Let that be done which is most to the interests of the Expedition; but, all things considered, *I do not think I ought to accept a second place* in such an Expedition as the present one has now become. I admit, however, that I am open to advice, even on this point; though this is perhaps saying too much.

"I drop this note because there is no time to lose; and I fear lest a personal visit should not be convenient to you at so early an hour. I am anxious to have the matter settled at once. I will be at the Consulate at 10 A.M.; but will come immediately, if you and Mr. Dawson wish me to do so.

"I am sincerely yours,

"Charles New."

"DEAR DR. KIRK, "Shangani, May 4th, 1872.

"I have been exceedingly anxious to take your advice upon the course I ought to pursue regarding the Livingstone Search Expedition; but, considering your relationship to the other members of the Expedition party, I have felt some delicacy in appealing to you, when only my personal, and not the general, interests of the Expedition have been concerned.

"Were they necessary, my services are still at the command of the Expedition; but as matters are now, I feel obliged to retire. It cannot be necessary that three Europeans should be engaged upon such an Expedition as this has become, and I should not feel justified in making use of the Expedition funds for mere working out of any personal scheme whatever.

"I feel very sorry to be obliged to take the course I am taking now, for I was second to no member of the Expedition party in sincere devotion to its main object. I repeat that I regret that I can no longer be of service to it.

"With many thanks for the kindness and consideration I have received at your hands on all occasions,

"I am yours sincerely,

"CHARLES NEW.

"P.S.—May I ask your advice upon one point? My connection with the Expedition will have occasioned me some little loss, but I do not think I ought to allow our *missionary funds* to suffer more than neccessary. Do you think I am entitled to a passage home at the expense of the Expedition? I will not mention other matters.

"To J. Kirk, Esq., M.D., H.B.M. Consul, &c."

THE LETTERS FROM DR. LIVINGSTONE to the late President and other members of the Society, brought to Europe by Mr. H. M. Stanley, were received by the Foreign Office on the 1st of August, Mr. Stanley himself arriving in London on the 2nd. On the 5th, Mr. Stanley called at the Society's Rooms, and on the 6th he made a second visit by appointment, and was received by Mr. Francis Galton, Admiral Sir George Back, and other Members of the Council; the chief result of the conversation which then took place being the acceptance by Mr. Stanley of the invitation given him by Mr. Galton, as President of the Geographical Section of the British Association to assemble at Brighton on the 14th August, to read a paper to the Section, on Tanganyika and his journey with Dr. Livingstone. It was considered, after much discussion by Members of the Council, that it was impracticable at this advanced season either to call a Meeting of the Society, or even assemble the Council, and the chief members of the staff of the Society were due at Brighton on the 12th or 13th. At the Finance Committee, which met on the 6th, the following Letter of Acknowledgment to Mr. Stanley, was proposed by Mr. Galton and unanimously carried:—

"SIR, "August 6th, 1872.

"In the name of a Committee of the Council of the Royal Geographical Society, which has just held its Meeting, I beg to return you our best thanks for the transmission of direct intelligence from Dr. Livingstone, to several Members of the Council of the Royal Geographical Society.

"This is the very earliest opportunity at which it was possible to convey their thanks, as the letters in question did not reach their destination until the latter end of last week.

"I take this opportunity of begging you, in the name of the Committee, to accept our most cordial acknowledgments for the timely succour rendered to Dr. Livingstone in his great need, and the expression of our admiration of the energy, perseverance, and courage with which you conducted your Expedition."*

"I have the honour to be, Sir,

"Your obedient servant,

(Signed) "H. C. RAWLINSON,
President R.G.S.

"H. M. STANLEY, ESQ.,
"*New York Herald.*"

The next meeting of the Committee was held on the 2nd of September, Lieutenant Dawson being present, having arrived in London on the 24th of August. Other meetings were held on the 3rd and 6th of the same month, the result of which was the passing of a series of Resolutions, condemnatory of Lieutenant Dawson's act in breaking up the Expedition. These Resolutions are embodied in the following 'Second Circular,' which was ordered to be issued to the Subscribers:—

SECOND REPORT TO THE SUBSCRIBERS, BY THE LIVINGSTONE SEARCH AND RELIEF COMMITTEE.

THE Livingstone Search and Relief Committee of the ROYAL GEOGRAPHICAL SOCIETY, in accordance with the intention implied in the concluding paragraph of their Report of August 9th, have now to inform the Subscribers of the steps taken on the arrival of Lieut. Dawson in England, and to record their final judgment on his conduct in command of the late Expedition.

Lieut. DAWSON, on being asked by the Committee at their first Meeting after his arrival whether he had any statement to make in addition to his Report,† replied that he had not, and that he preferred giving answers to written questions, on points regarding which the Committee might require further explanation. The following are the questions which were thereupon forwarded to him, and the answers he sent in reply:—

Questions sent to Lieutenant Dawson, September 3rd, 1872.

1. The Committee, having referred to your Instructions, observe that "you were selected as the leader of an Expedition to seek for Dr. Livingstone, to relieve his immediate wants, and to afford him means of returning to England." They would be glad to know on what grounds you considered, on May 3rd, 1872, that you had been forestalled in these objects, and that you were, consequently, justified in breaking up the Expedition?

2. The Committee observe from your Report that, after breaking up the Expedition, you gave permission to Lieut. Henn and Mr. Oswell Livingstone to convey stores and supplies to Dr. Livingstone at Unyanyembe, stating that you considered such stores to be the Doctor's property, and justifying the despatch by pointing out that "the heavy expense of the fit-out of the Expedition had been already incurred." Did it not occur to you that if any officer was thus "to take charge of and conduct the caravan conveying the stores to Unyanyembe," it was your duty to have gone yourself, rather than to have deputed your subordinate Lieut. Henn? And what were the considerations which decided you to adopt a contrary course?

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* This letter was made public in the chief daily newspapers.

† *Ante*, p. 419.

3. Are there any written documents, such as correspondence between Dr. Livingstone and Dr. Kirk, or between Dr. Kirk and the Foreign Office, which were accessible to you at Zanzibar, and to which you would desire to refer the Committee in justification of the course you adopted in withdrawing from the conduct of the Expedition?

4. Whilst at Zanzibar did you write to Dr. Livingstone to assure him of the interest which was felt in his welfare by the Royal Geographical Society and by the British public at large, as testified by the equipment of the Expedition under your charge, and to explain your reasons for not proceeding to Unyanyembe?

5. On what grounds did you come to the conclusion that any attempt on your part to obtain Geographical information from Dr. Livingstone would cause him annoyance, and that "your presence in the country as a surveyor would be highly irritating to him"?

Lieutenant Dawson's Answers, sent September 6th, 1872.

1. My reasons for considering I had been forestalled in the main objects of the Expedition were:—

a. On account of a letter received at Zanzibar, April 29th, by the American Consul from Mr. Stanley.

b. From what I learnt from three men of Mr. Stanley's guard, to whom this letter had been entrusted.

c. From letters received at Zanzibar from the leading Arabs of Unyanyembe. All these authorities agreed that Dr. Livingstone was alive and well, and had been relieved, and that he wished to remain in Africa. My reasons for breaking up the Expedition, as formerly organised by the Royal Geographical Society, were not forestallment only, as your question might imply, but—1st. Forestallment of main objects; and, 2nd. That further procedure to map the country, and endeavour to procure copies of Dr. Livingstone's Geographical information would prove injurious to him, for reasons specified in Answer (5).

2. (1) That my application to the Admiralty for leave to travel for eighteen months was replied to, that I had "eighteen months' leave from England to enable me to take charge of the Expedition into Central Africa in *search* for Dr. Livingstone." (2) My presence as a surveyor in the country would prove annoying and detrimental (*see* Answer 5) to Dr. Livingstone, and, as *escort only*, superfluous and expensive. (3) Lieut. Henn undertook to escort the caravan, and not being a surveyor, or provided with private instructions for mapping the country, would not do that injury to Dr. Livingstone's work hereafter which I wished to avoid. (4) Mr. Oswell Livingstone wished to see his father on private pecuniary matters; heavy expense having been already incurred, remaining outlay necessary for his journey would be by no means disproportionate to the benefit to Dr. Livingstone's family, which the meeting of father and son would effect.

3. No public written documents. I saw Blue Book, Class B, Slave Trade, 1870, containing letter, full contents of which I had not known before, having up to that time only read Royal Geographical Society's official version of that letter in their 'Report of Proceedings.'

4. No one, to my knowledge, wrote to Dr. Livingstone, to the effect that interest was felt in his welfare by the Royal Geographical Society; but I believe that Dr. Kirk and Mr. Oswell Livingstone both wrote to inform him

of the interest felt for him by the British public, and of the arrival of the expedition at Zanzibar.

5. (1) Letter in Blue Book already referred to.
(2) Dr. Livingstone's *ipse dixit* to same effect at Zanzibar before last entering the country.
(3) Dr. Kirk's thorough knowledge of Dr. Livingstone's character and frame of mind.

(Signed) L. S. DAWSON,
Lieutenant R.N.

Having carefully weighed these answers, the Committee proceed to record their judgment as follows:—

They do not consider that Lieut. Dawson was justified in breaking up the Livingstone Search and Relief Expedition on the grounds stated by him, and they express their disapprobation of his conduct in so doing.

They do not admit the validity of Lieut. Dawson's plea that his "presence as a surveyor would prove annoying and detrimental to Dr. Livingstone," and that the "endeavour to procure copies of his Geographical information would prove injurious to him." In the first place, if Lieut. Dawson objected to these duties, the proper time to have stated his objection was before he signed and accepted, in London, the Instructions in which the said duties were specified. Moreover, in the Instructions, the Council distinctly made Geographical observation subordinate to the succour of Dr. Livingstone; and, in requiring Lieut. Dawson to obtain Geographical information, they asked only for what Dr. Livingstone had hitherto always supplied. The Committee further believe that Lieut. Dawson's arrival, with an ample outfit of new standard instruments, would have been welcome to Dr. Livingstone, whose instruments are now seven years old, and probably no longer fitted for the important work which he has still to accomplish.

As great stress is laid by Lieut. Dawson on his discovery, at Zanzibar, that certain passages in a despatch from Dr. Livingstone to the Foreign Office (Blue Book, Class B, Slave Trade, 1870) had been omitted from the document as published in the Royal Geographical Society's 'Proceedings,' which passages he believed to indicate dissatisfaction on the part of Dr. Livingstone with the Society, the Committee think it necessary to explain that the passages in question do not refer to the Society at all; but, in one case, to a manuscript map drawn for Dr. Livingstone's use by a private friend; and, in the other, to the compilation of a map published with his 'Missionary Travels' in 1857, by Mr. Murray, with which the Society had nothing to do. But, even if Lieut. Dawson had been correct in his interpretation of these passages, the Committee consider that he would not have been justified in allowing this to influence him in abandoning the Expedition.

The Committee repeat their expression of regret at the abrupt termination of the Expedition. They think that, as the expenses of the journey to the interior and back to Zanzibar had been already incurred, as stated in Lieut. Dawson's letter to the Council of April 19th last,* the leader should, at any rate, have proceeded to Dr. Livingstone, taking on the supplies, medicines, arms, instruments and guards, and assuring the great traveller, by personal intercourse, of the sympathy of his countrymen, and their anxiety to relieve him. That Lieut. Dawson did not adopt this course, or even write to Dr. Livingstone to inform him of the Expedition and its abandonment, they attribute to a lamentable error of judgment.

The Committee consider that, as the responsibility of breaking up the Expedition on May 3rd rests entirely with Lieut. Dawson, they are not

* Printed in the 'Proceedings of the Royal Geographical Society,' of June 10th.

required to express an opinion on the conduct, subsequent to that date, of the subordinate members of the original party, who acted, at Zanzibar, under no official obligations. With regard, however, to the Rev. Mr. New, who was engaged by Lieut. Dawson at Zanzibar, they feel bound to say that, having heard from him a full explanation of the circumstances under which he acted, they acquit him of all blame, and place it on record that he has in no way forfeited their confidence.

1, SAVILE ROW, *September 14th*, 1872.

The following is the letter brought by Mr. Stanley to the late President, Sir Roderick Murchison. It was received by the Foreign Office on 1st August, and by the Society on the 22nd October:—

Letter from DR. LIVINGSTONE *to* SIR R. MURCHISON.

"Unyanyembe District, 2° south of Kazeh,
March 13, 1872.

"MY DEAR SIR RODERICK,

"I received information here on the 18th February, with great concern, from Agnes, of the severe illness with which you have been visited, and the first impulse I felt was at once to go home to you; but after some reflection I came to the conclusion that you would at once say, 'You should have finished the task I gave you, before leaving.' I feel sure that all my friends wish me to make a feasible finish-up of the sources before I retire. In a letter I got in February, 1870, Agnes said, 'Much as I wish for your return, I would rather that you finished your work to your own satisfaction than come home merely to gratify me.' 'Right nobly said,' I thought.

"I have written you a long account of the worry, thwarting, and baffling I have endured in trying to work my way through the cannibal Manyuema down the central line of drainage—Webb's Lualaba; but it is not worth sending now. I got one letter from you in February, 1870, the first I received from you since one dated 13th March, 1866, but I could not doubt that you had written oftener. The loss of your letters has left me very much in the dark. I did not know that I had a penny of income till Mr. Stanley came, and brought a mail he seized for me here, after it had been fourteen months on the way, and in it I saw the Royal Geographical Society's Report stated that 3500*l.* had been received for the East African Expedition, which I ventured to suppose means mine.* I don't know where that money is, or if it really is for me; I wish to give my children a little, but I have to ask the Messrs. Coutts to inquire of you about it. I have been trusting to part of the price of my little steamer at Bombay, and determined, pay or no pay, to finish my work if I live. The want of letters was bad; the want of goods was worse, and the only supplies that I virtually received were part of a stock I paid for, and, with Dr. Seward, sent off from Zanzibar, in 1866, to be placed in depôt in Ujiji. They were plundered by the Governor here, but I got a share; and it was a part of this share that I took the precaution to reserve at Ujiji in case of extreme need, and found on my return lately. But for this I should have been in beggary; for a lot of goods sent off by Dr. Kirk, through a Banian slave-trader, called Ludha Damji, were all sold off at Ujiji by the drunken half-caste tailor, Shereef, to whom they were entrusted. He must have

* The 'Proceedings' of this Society contain no such statement. The rumour may possibly refer to the 1000*l.* obtained from Government by Sir Roderick Murchison and the Council in 1870 for the relief of Dr. Livingstone.—[ED.]

reported that he had delivered all, for the statement was made in the House of Lords that all my wants had been supplied. He divined on the Koran, and found that I was dead, and then invested all in slaves and ivory for himself. There being no law except that of the gun or dagger, I had to wait in misery till Mr. Stanley came and proved himself truly the good Samaritan.

"Another lot of goods was entrusted to Ludha again, and he to slaves again with two free head-men who were thieves. Mr. Churchill wrote on the 19th October, 1870, that they were all ready to leave, all impediments had been removed, and he remarked rather pleasantly 'that they were not perfect, but had expressed willingness to go;' and then they lay at Bagamoio three and a half months, and no one looked near them. Near the end of February they heard that the Consul was coming, and started off two days before his arrival, not to look after them, but to look after the wild beasts along the Ujiji road, and show them to the captain of a man-of-war. Here they refused to go with Mr. Stanley to Ujiji, because of a war which did not prevent him from going, nor him and me from coming, though it is still going on. I seized what remained of the goods after the slaves had feasted sixteen months. On the 18th ultimo one of the head-men died of small-pox; the other non-perfect head-man, besides running riot on my goods, broke the lock and key of Mr. Stanley's store, and plundered his goods too.

"Traders get their goods safely by the same carriers we employ; but all our slaves are deeply imbued with the idea that they are not to follow, but force me back. My expedition is looked on with disfavour by all the Banians, who are really and truly the great slave-traders of the country. But for the goods, guns, ammunition, advanced by the Banians, no Arab who travels could go inland to slave. It is by their money that the slave-trade is carried on. The wretched Governor here—the same who plundered Burton and Speke pretty freely—is their trade-agent; but simple people call him the 'great Sheikh Syde ben Salem,' &c. All my letters disappeared here. My sketches, maps, astronomical observations, &c., sent before cholera began, were never heard of beyond this. When Shereef sold off all my stores, except a few pounds of worthless beads, a little coffee and sugar, the Governor wrote to me that he had no hand in it. I never said he had. I suppose that the Banians did not sit down and instruct their slaves to rob and baffle me; a mere hint would be sufficient, And then, when they reached me, they swore that the Consul told them not to go with me—and he had paid them more than double freemen's pay. Had they been with me and mutinied, I should have blamed myself as partly the cause, from want of tact or something; but after they had been paid and fed for sixteen months, it was mortifying to find myself virtually without men. I have lost two full years of time, being burdened by 1800 miles of extra tramp, and how much waste of money I cannot say, all through the matter of supplies and men being unwittingly committed to slave-dealing Banians and slaves. And then it is interesting to see by some newspapers sent by John Webb, United States' Consul at Zanzibar, to Mr. Stanley, that 'companion of Livingstone,' he was called, had written to the Royal Geographical Society that he could send packets to Ujiji in one month. Mr. Webb sent nine packets and packages in the eleven months of his (Stanley's) trip. The sixteen months that elapsed from my last mail of November, 1870, included those eleven months, but Mr. Webb's messengers were not allowed to lie feasting at Bagamoio, in sight of the Consulate, for three and a half months, as mine were. Nor were the Banian low cunning and duplicity instilled into their minds. Kirk may probably be able to explain it all. Ludha said so and so, and he amiably believed him. Ludha told Mr. Stanley that no pagazi, or carriers, could be got. He went over to Bagamoio and soon got 140 and 30 free men; but now I am all right. I have abundant supplies of all I need to finish my work. Some I seized from Kirk's slaves, and Mr. Stanley gave me more; so I

am thankful to say that I am now better off than when I got a share of what I sent off in 1866. I feel quite exhilarated by the prospect of starting back as soon as Mr. Stanley can send me fifty free men from the coast. Don't imagine, from my somewhat doleful tone, that I am trying to excite commiseration and pity. When Zanzibar failed me so miserably, I sat down at Ujiji only till I should become strong, and then work my way down to Mteza. I am now strong and well and thankful, and wish only to be let alone, to finish by the re-discovery of the ancient fountains. In Dr. Kirk's letter he talks hazily about Tanganyika and my going home from being tired, and the work being finished by another (? himself). You remember that I recommended him for the task, and he would not accept it from you without a good salary, and something to fall back on afterwards. I went unsalaried;* the sole hope I had was the statement in yours of March 13, 1866: 'Do your work, and leave pecuniary matters to Young and me.' I have been tired often, and began again. I have done it all on foot, except eight days' illness with pneumonia and the trip down Tanganyika. I could never bear the scorn the Portuguese endure in being carried when quite well. I am sorry to have to complain of any one; but the loss of time, useless tramps, and waste of money, are truly no faults of mine. If you share in Kirk's idea that I must have been all this time trying if Tanganyika communicated with Albert Nyanza, I regret the destruction of my sketch maps and astronomical observations; but in a former case an imperfect sketch map was made the means of fleecing me, and in the lost maps I did my duty notwithstanding.

"Tanganyika is of no importance in connection with the Nile, except in a very remote degree. The interesting and great valley lies altogether west of it. In that valley there are five great lakes and three large rivers—Bangweolo, Moero, Kamolondo, Lake Lincoln, and another, which the slaves forced me to leave as the Unknown Lake. The large rivers—Bartle Frere's, otherwise Lufira; Webb's Lualuba—the central line of drainage; then Sir Paraffin Young's Lualaba, with its name further down Lomame—all go into the central Webb's Lualaba; Bartle Frere's through Lake Kamolondo; Young's (I have been obliged to knight him to distinguish him from our friend the man-of-war's man) Lualaba through Lake Lincoln, and, as Lomame into Webb's, and four or five days beyond the confluence into the Unknown Lake, which, from the great westing I made, some 5° w. of Ujiji, must be part of Petherick's branch. This is the interesting field. The correlation of the structure and economy of the watershed with these great lakes and lacustrine rivers is the theme of my prize. When you heard that the sources were further south than any one dreamed, in the exuberance of your kindly heart you were going to award something to Beke, Findlay, and Arrowsmith, for having dreamed about it. You had no idea that the watershed was 700 miles long and the fountains innumerable. I smiled, of course good naturedly, to think that you would need to divide the 700 miles among the three, and thereby show a great physiological discovery by your friends—the division of labour in dreaming. I am much more savage now than you, and any one who competes after I have given my own explanation will be ordered out for instant execution without benefit of clergy. I doubt if there is an Upper Nile basin. I found it a gradual slope from the sources down, and I reached the altitude ascribed to Gondokoro. Mr. Stanley will tell you about what he saw of Tanganyika. I declined to examine it in 1869 because Ujijians wished to mulct me of the few goods I had, and there was no inducement to spend all in patching up Burton's failure rather than work out the great main line of drainage from the watershed.

* The Council of the Royal Geographical Society contributed 500*l.* towards the expenses of the Expedition, and the Foreign Office granted a sum of like amount, but no salary was attached to the Consulship at that time.—[Ed.]

"I earnestly hope that you will be so far recovered when this reaches you as to live in comfort, though not in the untiring activity of your earlier years. The news of our dear Lady Murchison's departure filled me with sincere sorrow. Had I known that she kindly remembered me in her prayers it would have been a source of great encouragement. I often thought that Admiral Washington and Admiral Beaufort looked down from their abodes of bliss, to which she has gone, with approbation. Sir Francis's words to the Arctic explorers, that they 'were going on discovery and not on survey,' have been a guide to me, and I am in hopes that, in addition to discovery, my disclosures may lead to the suppression of the East Coast Slave Trade by Banian British subjects. If the good Lord of all grants me this, I shall never grudge the toil, time, and trouble I have endured. I pray that His blessing may descend on you according to your need, and am, &c.

(Signed) "DAVID LIVINGSTONE.

"P.S.—Mr. Stanley will be at the Langham Place Hotel when this reaches you; attentions to him and James Gordon Bennett will gratify me. Agnes will keep my London box and my Journal, which I send home, sealed, by Mr. Stanley.

"D. L."

Letter from Dr. KIRK *to* EARL GRANVILLE, *relating to the Livingstone Search and Relief Expedition.*

[Communicated by the Foreign Office.]

"MY LORD, "Zanzibar, 28th May, 1872.

"I have the honour to report that, on receipt of certain intelligence that Dr. Livingstone was at Unyanyembe, distant only thirty days' journey from the coast, in good health and in possession of ample supplies, but without any intention of leaving Africa for the present, Lieut. Dawson, leader of the Search and Relief Expedition, determined that his services as hydrographer and skilled surveyor were not required. Dr. Livingstone's son still insisting on proceeding to join his father and follow him, and Lieut. Henn, under this circumstance, thinking it hardly well to allow him to proceed alone, took command on Lieut. Dawson retiring.

"Mr. New, missionary, who had joined the expedition here as interpreter, offered also to go; and the new party were ready for a start, when Mr. New resigned on the ground that, after better reflection, he could not accept a second position. His services were at once dispensed with and his resignation accepted.

"Lieut. Henn, Mr. W. O. Livingstone, and the native guard, next proceeded to the African mainland, where the goods had already been collected under Lieut. Dawson. The party was ready to start, and perhaps no Expedition ever set out under better auspices or better fitted out, when Mr. Stanley, the American newspaper correspondent who a year ago had gone off, concealing in Zanzibar that the object of his travels was to find Dr. Livingstone and obtain publication of the results of his travels, reached Bagamoyo. Mr. Stanley lost no time in assuring Lieut. Henn that he had written orders from Dr. Livingstone to turn any Expedition he might meet coming up country to him, and informed Lieut. Henn that he and his party would be far from welcome and their presence only an incumbrance, as he, Mr. Stanley, held the Doctor's own orders for a gang of men and the special supplies he still required.

"On returning to Zanzibar, where it was obvious, from the terms of Dr. Livingstone's official correspondence, that he would not welcome the arrival of any assistance unless through Mr. Stanley, his confidential agent, Lieut. Henn necessarily retired; but Mr. W. O. Livingstone still persisting in his

purpose to reach his father at all hazards in company with Mr. Stanley's men, the Expedition stores were transferred to his care. Mr. Stanley lost no time in applying for the 500*l.* that Dr. Livingstone had, in a letter I have already sent in copy, ordered me to deliver over. I informed him that I then held no such fund, all having been some time before made over by your Lordship's orders to the Search Expedition, and that the whole responsibility of the same rested with Mr. W. O. Livingstone. Mr. Stanley thereupon destroyed a cheque of Dr. Livingstone for the sum of 500*l.*, drawn on Bombay.

"Mr. W. O. Livingstone, since perusing his father's letters, and after seeing how grossly unjust and ungrateful his behaviour, to myself in particular, has been, refused to accompany Mr. Stanley's party or go to his father. He has given Mr. Stanley all he needed in stores and money, and the American party left yesterday for the coast.

"I shall here add, as otherwise my conduct may be misrepresented, that Mr. Stanley, in order to evade blame if his men did not reach Unyanyembe in time, applied to me to see them started off after his departure from Zanzibar: this was positively and at once declined, and I informed him that I could not, after what Dr. Livingstone had done and said, act in any but an official capacity.

"Mr. W. O. Livingstone has sold off here the surplus stores of the Expedition, and will render his accounts to the Royal Geographical Society.

"With reference to my former remark, that claims might still come on Government for wages of the men engaged here and sent up country, I have now to observe that their bad conduct, of course, renders any such claim impossible. The small amount detained by me on an unpaid bill of Ludha, for additional expenses in sending up goods ordered by Mr. Churchill, remains in my hand, and, if not proved due, will be remitted to your Lordship.

"I have, &c.

(Signed) "JOHN KIRK."

On the 21st of October the President received from Earl Granville a copy of the following letter from Dr. Livingstone, written after he had become informed of the Expedition at Zanzibar and its abandonment. A similar letter, of the same date, addressed to Sir Bartle Frere, is added:—

"MY LORD, "Unyanyembe, July 1, 1872.

"It is necessary to recall to memory that I was subjected to very great inconvenience by the employment of slaves instead of freemen. It caused me the loss of quite two years of time, inflicted 1800 or 2000 miles of useless marching, imminent risk of violent death four several times, and how much money I cannot tell. Certain Banians, Indian British subjects, headed by one Ludha Damji, seem to have palmed off their slaves on us at more than double freemen's pay, and all the slaves were imbued with the idea that they were not to follow, but to force me back. By the money and goods of these Banians nearly all the slave-trade of this region is carried on. They employed dishonest agents to conduct the caravans, and this has led to my being plundered four several times. No trader is thus robbed. I sent a complaint of this to Dr. Kirk, and in my letter of the 14th of November last I enclosed a copy, in the hope that, if necessary, his hands might be strengthened by the Foreign Office in administering justice, and I was in hopes that he would take action in the matter promptly, because the Banians, and their dishonest agent Shereef, placed a private trade speculation between Dr. Kirk and me, and we were unwittingly led into employing slaves, though we all objected to Captain Fraser doing the same on his sugar estate. I regret very much to hear incidentally that Dr. Kirk viewed my formal complaint against Banians as a

covert attack upon himself. If I had foreseen this, I should certainly have borne all my losses in silence. I never had any difference with him, though we were together for years, and I had no intention to give offence now. But the public interest taken in this Expedition enforces publicity as to the obstacles that prevented its work being accomplished long ago. I represented the Banians and their agents as the cause of all my losses, and that the Governor here is their chief trade agent. This receives confirmation by the fact that Shereef, and all the first gang of slaves, are now living comfortably with him at Mfutu, a village about 12 miles distant from the spot at which I write.

"Having, as I mentioned in my above letter, abundant supplies to enable me in a short time to make a feasible finish-up of my work, and the first and second gangs of slaves having proved so very unsatisfactory, I felt extremely anxious that no more should come, and requested Mr. Stanley to hire fifty freemen at Zanzibar, and should he meet a party of slaves coming, by all means to send them back, no matter what expense had been incurred. I would cheerfully pay it all. I had no idea that this would lead to the stoppage of an English expedition sent in the utmost kindness to my aid. I am, really and truly, profoundly grateful for the generous effort of my noble countrymen, and deeply regret that my precaution against another expedition of slaves should have damped the self-denying zeal of gentlemen who have not a particle of the slave spirit in them. As I shall now explain, but little good could have been done in the direction in which I propose to go; but had we a telegraph, or even a penny post, I should have advised work in another direction that would have pleased the Council.

"A war has been going on here for the last twelve months. It resembles one of our own Caffre wars in miniature, but it enriches no one. All trade is stopped, and there is a general lawlessness all over the country. I propose to avoid this confusion by going southwards to Fipa, then round the south end of Tanganyika, and, crossing the Chambeze, proceed west along the shore of Lake Bangweolo. Being then in latitude 12° south, I wish to go straight west to the ancient fountains reported at that end of the watershed, then turn north to the copper-mines of Katañga, which are only about ten days south-west of the underground excavations. Returning thence to Katañga, twelve days s.s.w. leads to the head of Lake Lincoln. Arrived there, I shall devoutly thank Providence, and retire along Lake Kamolondo towards Ujiji and home. By this trip I hope to make up for the loss of ground caused by the slaves. I was forced back from near the confluence of the Lomame with Webb's Lualaba. Lomame is the prolongation of Lake Lincoln into the lacustrine central line of drainage—Webb's Lualaba. The route indicated utilizes my return tramp by going round outside, or say south, about all the sources together, and this, going back through Manyuema to take up the thread of exploration, would not do. It also takes me outside the area of the Ujijian or mainland slaving and bloodshed, which the Manyuema are learning to revenge. If I retired now, as I wish with all my heart I could do with honour, I should be conscious of having left the discovery of the sources unfinished, and that soon some one else would come and show the hollowness of my claim, and, worse than that by far, the Banians and their agents, who, I believe, conspired to baffle me, would virtually have success in their design. I already know many of the people among whom I go as quite friendly, because I travelled extensively in that quarter in eliminating the error into which I was led by the Chambeze being called, by the Portuguese and others, the Zambesi, I should very much like to visit the Basañgo, who are near my route; but I restrict myself to six or eight months to undo the losses I sustained. About five generations ago, a white man came to the highlands of Basañgo, which are in a line east of the watershed. He had six attendants, who all died, and

eventually their head-man, called Charura, was elected chief by the Basañgo. In the third generation he had sixty able-bodied spearmen as lineal descendants. This implies an equal number of the other sex. They are very light in colour, and easily known, as no one is allowed to wear coral-beads such as Charura brought except the royal family. A book he brought was lost only lately. The interest of the case lies in its connexion with Mr. Darwin's celebrated theory on the 'origin of species,' for it shows that an improved variety, as we whites modestly call ourselves, is not so liable to be swamped by numbers as some have thought.

"Two Mazitu chiefs live near the route. I would fain call and obtain immunity for Englishmen, such as has been awarded to the Arabs of Seyed Majid; but I am at present much too rich to go among thieves. At other times I could have gone safely, because, to use a Scotch proverb, 'No one can take the breeks off a Highlander.' With ordinary success, I hope to be back at Ujiji eight months hence. If any one doubts the wisdom of my decision, or suspects me of want of love to my family in making this final trip, I can confidently appeal for approbation to the Council of the Royal Geographical Society as thoroughly understanding the subject.

"Had it been possible for me to know of the coming of the late Search Expedition, I should certainly have made use of it as a branch expedition to explore Lake Victoria, for which the naval officers selected were no doubt perfectly adapted. The skeleton of a boat left here by Mr. Stanley would have served their purpose, and they would have had all the merit of independent exploration and success. I travelled for a considerable time in company with three intelligent Suaheli, who had lived three, six, and nine, years respectively in the country east of the Victoria Lake, there called Okara, but, on this side, Mkara. They described three or four lakes, only one of which sends its waters to the north. Okara seems to be Lake Victoria proper; about its middle it gives off an arm eastwards called Kidette, in which many weirs are set, and many fish caught. It is three days in length by canoe, and joins Lake Kavirondo, which may not deserve to be called a lake, but only an arm of Okara. Very dark people live on it, and have cattle. The Masai are further east. To the south-east of Kavirondo stands Lake Neibash, or Neybash; they travelled along its southern bank for three days, and thence saw Mount Kilimanjaro, also in the south-east; it has no outlet. Away far to the north of Kavirondo they described Lake Bariñgo (not Bahr Ngo). A river or rivulet, called Ngare na Rogwa, flows into it from the south or south-east. Its name signifies that it is brackish. Bariñgo gives forth a river to the north-east, called Ngardabash. The land east and north of Bariñgo is called Burukinegge, and Gallahs, with camels and horses, are reported; but my informants did not see them. I give their information only for what it may be worth; their object was plunder, and they could scarcely be mistaken as to the number of lakes where we suppose there is only one. The Okara or Lake Victoria proper is the largest, and has many very large islands in it. I have not the faintest wish to go near it, either now or at any future time. In performing my one work I desire to do it well, and I think that I may lay claim to some perseverance. Yet if ordered to go anywhere else, I should certainly plead 'severe indisposition' or 'urgent private affairs.' I have been reported as living among the Arabs as one of themselves; that only means that I am on good terms with them all. They often call me the 'Christian,' and I never swerved from that character in any one respect.

"An original plan of getting the longitude, which I submit to Sir Thomas Maclear, of the Royal Observatory at the Cape, gives 27° E. as the longitude of the great River Lualaba, in latitude 4° 9′ S. It runs between 26° and 27° E., and is therefore not so far west as my reckoning, carried on without watch, through dense forests and gigantic grasses, made it. It is thus less likely to be the Congo, and I ought to meet Baker on it. In reference to the ancient

fountains, I already know the four rivers that unquestionably do arise near or on the western end of the watershed. Mr. Oswell and I were told, about 1851, that the Kafue and Liambai (Upper Zambesi) arose at one spot, though we were then some 300 miles distant. The two rivers Lomame and Lufira come from the same quarter; the only point that remains doubtful is the distances of their fountain-heads, and this I am very anxious to ascertain. I send astronomical observations and a sketch-map to Sir Thomas Maclear by a native. The map is very imperfect, from want of conveniences for tracing, and no position is to be considered settled, or published until it is recalculated at the Observatory.

"There is a good deal of risk in so doing, but not so much danger as if I intrusted it to my friend the Governor. A former sketch-map, a multitude of astronomical observations, and nearly all my letters, always disappeared here; but it is better that they run the risk in the hand of a native than to go with me over waters innumerable. The fear of losing my Journal altogether led me to intrust it to Mr. Stanley to be kept by my daughter till I return, and I hope it has arrived safely. I am waiting here only till my 50 men arrive. The natural anxiety I feel for the safety of my son Oswell coming through the feverish districts between this cold highland and the coast would have been threefold increased had the naval gentlemen come.

"In conclusion, let me beg your Lordship to offer my very warmest thanks to them, to the Council and Fellows of the Royal Geographical Society, and to all who kindly contributed in any way towards securing my safety. I really feel that no one in this world ought to be more deeply grateful than

"Your most obedient Servant,

"DAVID LIVINGSTONE, Her Majesty's Consul, Inner Africa."

"My DEAR SIR BARTLE, "Unyanyembe, July 1, 1872.

"I embrace the opportunity of a native going to the coast to send a sketch-map and a number of astronomical observations towards the Cape Observatory; copies of the same were sent long ago (1869), but disappeared at this place of the 'longnebbed' name, and almost everything else sent subsequently vanished in the same way. I am now between two fires or dangers; for if I take my journal, map, and observations with me in my concluding trip, I am afraid that in crossing rivers and lakes they would be injured or lost. There is a danger, too, of losing them between this and the coast; but the last is the homeward route. I intrusted my Journal to Mr. Stanley for like reasons; and now I have but a short trip in prospect, to make a feasible finish up of my work. It is to go round south, about all the sources, while actually shaping my course towards the ancient fountains. I perpetrate a heavy joke at the Geographers by offering a prize for the best explanation of the structure and economy of the watershed, in correlation with the great lakes and lacustrine rivers, in producing the phenomena of the Nile; and now they will turn the laugh against me, if I have put in fountains which have no existence. The rivers that rise near the west end of the watershed I know, and they give me good hopes that the reports I have heard so often are true. I have a copy of Ptolemy's map with me, copied by a young lady at Bombay. It does not contain the fountains referred to, but it contains the *Montes Lunæ*, and, as I found the springs of the Nile rising at the bases of certain hills on the watershed in Ptolemy's latitude, I am bracing myself up to call everyone who won't believe in his *Lunæ Montes* a Philistine. After Katanga copper-mines, which are eight days north of the fountains, I go ten days north-east to extensive underground excavations, used as places of retreat and safety. One I came near, but was refused an entrance. It was sufficient to receive the inhabitants of a large district with all their gear. A burrowing race seems to

have inhabited Africa at a very remote period. Big feet are the only sculpture I have seen, and they are like the footprint of Adam on the mountain in Ceylon. Returning to Katanga, I propose to go 12 days north-north-west to the head of Lake Lincoln, and then turn back along Lake Kamalondo homeward. The Banians and their agents have hindered us greatly by palming off their slaves on Dr. Kirk and me as free men. If I can but make this short trip successfully I shall frustrate their design of baffling all my progress. I complained to Kirk against them, and he, unfortunately, took it as a covert attack on himself, which was never my intention, and makes me sorry. I think that the delinquents should be punished. In fear of a third batch of slaves being imposed on us, I desired Stanley, if he met any such, to turn them back, no matter how much had been expended on them. This led to the resignation of the naval officers in charge. I had not the remotest suspicion that a Search Expedition was coming, and am very much grieved to think that I may appear ungrateful. On the contrary, I feel extremely thankful, and from the bottom of my heart thank you and all concerned for your very great kindness and generosity. I wish they had thought of Lake Victoria when not needed here.

"By an original and perhaps absurd plan, I tried to get a longitude for the great central line of drainage out of a dead chronometer. I have submitted it to Sir Thomas Maclear. He is used to strange things. Ladies have come asking to have their futures told them by the stars. My horoscope tells me that in latitude 4° 9′ s. the Lualaba runs between 26 and 27° E. Never mind about the truth of it; it makes this great river less likely to be the Congo. Surely I may joke about it, when others get angry when they talk about Inner Africa, which they never saw. In a speech of yours, reported in an *Overland Mail* that came to hand yesterday, you say, if I read it right, that the Government has given 300*l.* to my daughters. I read it over and over again to be sure, for it seemed too good news to be true. If there is no mistake, my blessing upon them. I have only been trying to do my duty like a Briton, and I take it as extremely kind that me and mine have been remembered by Her Majesty's Ministers.

"I am distressed at hearing no tidings of Sir Roderick, except that he had been ill. It awakens fears for the dearest friend in life.

"With kind salutations to Lady and Miss Frere,

"I am, affectionately yours,

"DAVID LIVINGSTONE."

The Council held a Special Meeting on the 21st October, at which, after the Minutes of the various Committees which had met during the vacation had been confirmed, the proposition to confer a Gold Medal on Mr. Stanley was considered. It was resolved, "That the Regulations * for the mode of procedure in granting the Royal Premiums be suspended, and that the Victoria Medal for 1873 be awarded to Mr. H. M. Stanley, for his relief of Dr. Livingstone, and for bringing his valuable Journal and Papers to England." It was also resolved, "That the President be requested, in the name of the Council, cordially to thank Mr. James Gordon Bennett for the generous and philanthropic spirit with which he conceived the idea of relieving Dr Livingstone and supplied funds for the purpose."

On the evening of the same day, a dinner was given at Willis's Rooms, in honour of Mr. Stanley, at which upwards of 100 Fellows of the Society and their friends attended; the President, Major-General Sir H. C. Rawlinson, in the chair.

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* These are unprinted Rules, relating to the time of the year and manner of voting the Medals, drawn up for the guidance of the Council, and do not form part of the Bye-laws of the Society.

LIVINGSTONE SEARCH AND RELIEF EXPEDITION.

Balance Sheet.

Receipts.	£.	s.	d.	£.	s.	d.
Subscriptions :—						
Received	5000	14	11			
Promised	268	16	0			
				5269	10	11
Balance of Government Grant transferred to the Fund	..			557	10	8
Half Year's Interest on £2500 Exchequer Bills	..			30	10	10
				£5857	12	5

Expenditure.	£.	s.	d.
Outfit, Passage Money, &c., for Lieutenant Dawson and Party	538	19	4
Instruments and Maps	150	19	0
Presents to Native Chiefs	158	14	0
Advertising, Stationery, Stamps, &c.	177	12	2
Sundry small charges	19	2	6
Pay of Natives employed at Zanzibar	355	16	4
Pay of Natives, and goods supplied to Mr. Stanley	312	9	5
Miscellaneous expenses at Zanzibar—Loss on Sale of Goods, &c.	318	6	11
Passages to England, expenses *en route*, &c.	649	16	3
Balance in the hands of Dr. Kirk and the Royal Geographical Society	3175	16	6
	£5857	12	5

14th November, 1872.

2.—*On the Scope of Scientific Geography.* By General R. Strachey, R.E., F.R.G.S.*

The chief object of the British Association for the Advancement of Science, is declared to be "to give a stronger impulse, and a more systematic direction to scientific enquiry;" and this Section of the Association deals with questions of Geography, in the hope that thereby the interests of science will be advanced. It is because I believe that geographers in general, and British geographers in particular, are apt to view geography too much as a field for adventurous and enterprising exploration, and too little as a subject for scientific investigation, that I have to-day proposed to discuss the question, What is the scope of Scientific Geography? In doing this I am glad to find that I shall be acting in the spirit of the excellent opening address of our President, who emphatically declared that he looked forward with eagerness to the growth of geography as a science in the usual acceptance of the term; and I will venture to hope that what I have to say to-day may in some degree contribute to the realisation of such a result.

Nothing is further from my intention than to undervalue the courage, the endurance, and the intelligence of the better class of geographical explorers, whether they belong to our own or any other country; or to depreciate the results of their labours, too often carried on, not only under circumstances of great personal discomfort or hardship, but also of extreme peril for their very lives. Neither do I question the absorbing interest that attaches, and rightly attaches, to many narratives of travels in little known regions, both by land and by sea. But it is necessary to remember, and remembering to affirm distinctly, that too often such narratives, whatever be their other merits, hardly deserve to be spoken of as scientific, and go little beyond an account of personal adventure, combined with a bare itinerary and a partial map. I do not desire to suggest that narratives of explorations or travels, which do not come up to a decided scientific standard, may not from other points of view be of much value, or that discussions of subjects not of a distinctly scientific character should necessarily be excluded from the matters brought before this Section of the Association: but I must unhesitatingly contend, that at any rate, so far as the British Association for the Advancement of Science is concerned, the most important aspect of geography is its scientific aspect; that this Section should have for its main object to realize more completely and more precisely the requirements of scientific method in relation to geography; and that each of us, so far as he is able, should strive to advance science, by respecting those requirements, and acting in accordance with them.

Science in its broadest sense is organized knowledge, and has for its aim the observation and classification of the phenomena of which we become conscious by means of our senses, and the investigation of the causes of which those phenomena are the effects. It is by means of the application of this conception of science to the class of ideas which we designate as Geography, that we shall obtain the true answer to the question, the solution of which I have proposed to undertake on this occasion.

The first task of the geographer, then, is to ascertain by observation, and delineate by maps and describe the forms and relative positions and characteristics of the various features of all regions of the earth. This supplies the first part of the requirements of a scientific pursuit of geography. It is

* Read before the Geographical Section of the British Association at Brighton, August, 1872.

that branch of the study which has been most fully carried out, and to it, indeed, the notion of geography is still popularly restricted.

But to transform any merely empirical collection of facts into science, the classification of the observed phenomena, and the investigation of their causes, still remain to be undertaken. The scientific geographer, therefore, proceeds, after having obtained such a fundamental series of simple geographical observations as that to which I have just alluded, to view them in relation to the multitude of co-existing phenomena which constitute the special characteristics of the several regions of the globe; and thence endeavours to deduce the laws in accordance with which these phenomena mutually depend one on another. This branch of geography is commonly spoken of as Physical Geography, but it is more correctly the science of geography.

The progress of geography has thus led from the first rough ideas of relative position of neighbouring places, to our present advanced state of knowledge of almost all parts of the earth's surface. By the gradual extension of observation to distant regions, and the ultimate adoption of correct notions of the form of the earth, the more serious errors of the earlier approximate ideas were corrected, and at length a foundation was laid for precise determinations of position and the accurate delineation of form in detailed maps. Coincident with these additions to the precise knowledge of the forms and positions of the great areas of land and sea, progress was made in the observation of other characteristics of various regions visited by travellers. The first impressions based on the striking differences seen in going from one country to another,—in the climate, the vegetable and animal productions, the people, their languages and customs,—were soon to be supplemented and corrected by the perception of similarities no less remarkable and real. The great regions of equatorial heat and polar cold, and the main characteristics of the mountain ranges, of the plains, and the seas, were quickly appreciated. The special variations of climate, of seasons, of wind and rain, that characterize various localities both on the land and the ocean, were observed and more or less fully understood. The grouping of certain plants and animals of peculiar structure or of peculiar families, in certain terrestrial or marine provinces, and the circumstances under which such groups varied from place to place, or reappeared more or less completely, and in identical or nearly identical forms, in widely separated regions, gave fresh occasion for observation and thought. Combined with these facts, and studied with them, were the physical peculiarities, the languages and the customs, and the history of the races of men, varying from country to country, but still often bearing a certain common stamp of similarity over large areas.

It was by the gradual accumulation and classification of such knowledge that the scientific conception of geographical unity and continuity at length became possible; and thence was derived the conclusion that, while each different part of the earth's surface had its own particular characteristics, the general system of animate and inanimate nature was one and the same everywhere; so that the special features of every region are due to the operation of particular local causes or conditions acting in conjunction with the universal laws of organic and inorganic matter.

Scientific geography has, then, for its aim the investigation of those local conditions of the earth's surface, which I have spoken of as being the efficient causes of a large portion of the natural phenomena which come within the range of geographical research; and the enquiry, in the one direction, how such local conditions arose, and in the other, how they became the active agents in producing the phenomena in question.

The field into which we are thus led is almost conterminous with the entire circle of human knowledge. And although such a result may at first seem to

indicate that the task set before us is beyond our powers from its vastness, yet there is, I think, no real ground for such a fear. Scientific geography views, as a connected and interdependent whole, the numerous classes of natural phenomena, each of which forms the ground-work of a separate well-defined section of knowledge. And in carrying out such an aim, the geographer proceeds in no respect on a different method from that followed by other scientific enquirers. In every branch of science the student has to rely on the researches and the conclusions of those who cultivate other branches of knowledge. Indeed, it is for the very reason that the progress of knowledge has been so great, that the special branches into which it is divided are so numerous, and that the difficulty of original research being attempted by any one person in more than some single branch is thereby so much increased, that it becomes not only useful, but essential, to obtain the best possible view of the aggregate result of all the forces of nature in a connected form, such as that which I have represented to you as constituting the true scope of scientific geography.

The better to enable you to realize in a clear manner my own conceptions of this subject, and to test, and, if necessary, to correct them by reference to your own conclusions, I will now proceed to specify, somewhat more in detail, the system according to which geographical observations should, in my estimation, be treated, to comply with the requirements of scientific method.

In undertaking the precise study of the earth's surface, we speedily find that to admit of the correct delineation of its features, or the preparation of accurate maps, a knowledge of the true form and exact magnitude of the earth is essential. On proceeding to measure the earth's dimensions, we are brought to consider it as one of the constituent parts of the solar system, and to perceive that its form has been imparted to it by the operation of the universal force of gravity, the great power which underlies every fact of nature, and, so to speak, maintains the existing frame-work of all existence within the solar system. To give precision to our ideas of position on the earth's surface, we adopt, for reference, imaginary circles of latitude and longitude, in dealing with which we are compelled to seek the aid of mathematical and astronomical science. In all these operations it becomes necessary, in order to secure such accuracy in our results as is now felt to be essential, to proceed with the most careful attention to, and knowledge of, the laws of gravitation, of heat and light, failing which, satisfactory progress would very soon be arrested. To obtain exact results from observations made with optical instruments, knowledge of many of the phenomena of light—that wonderful force which we bring into our service—is requisite. To admit of the exact measurement of distances, a knowledge of the laws of heat in affecting the expansion of the materials composing our measuring rods is necessary. To determine with precision, from astronomical observations, the latitude of any place, a rigorous examination of the directive force of gravity or the position of the plumb-line is called for. Thus, at the very outset, the study of many of the elementary physical forces is rendered obligatory on the scientific geographer.

The preparation of maps of the horizontal projection of the surface almost immediately leads us to the consideration of another element of position, namely, elevation. To determine this with accuracy, we must fix upon a datum surface from which to reckon our distances or altitudes, and the mean level of the sea has been accepted for this purpose. But here again, excepting at places near the sea, the necessary datum cannot be exactly ascertained without reference to the form of the earth and the direction of the force of gravity; moreover, the complications everywhere arising from the periodical changes in the sea-level, and the consequent difficulty of

determining the true mean level, and the instability of the earth's surface itself, to which all measurements of the sea-level must be referred, give rise to various delicate questions calling for special treatment. Such difficulties suggest, if they do not indeed require, fresh investigations into other classes of facts.

The importance, in a strictly scientific point of view, and quite apart from their practical utility, of correct maps, indicating as far as possible the elevations or depressions of surface and other physical facts, should be distinctly appreciated. There is no other means by which we can be so thoroughly impressed with those relations of position and magnitude which constitute so large a portion of the ground-work of geographical investigation, and maps and graphic representations of various classes of phenomena, may be regarded as essential instrumental appliances or apparatus for assisting the operations of the mind, such as we have to seek in every branch of scientific enquiry.

From the study of the external forms of the surface of the earth as regards horizontal extension and elevation, we naturally pass on to examine the character of its constituent parts, or the materials of which it is composed.

The broad distinction between the land and the sea is at once apparent.

The periodical variations of the level of the oceanic surface caused by the tides, lead us into enquiries which can only be prosecuted by help of astronomical and mathematical science. Other wide fields for investigation are opened to us, in the observation of the varying depth of the sea, the form of its bed, the currents that affect it, the waves that agitate its surface, the constitution and condition of its waters, and other characteristics which it presents to us.

The forms of the solid crust of the earth determine the outlines of the seas, in which the waters have collected under the operation of gravity, over the lowest parts of that crust. The tides, developed by the attraction of the sun and moon, are modified by the motion of the earth on its axis and in its orbit, as well as by the motions of the other heavenly bodies, and the local forms of the sea-bottom over which the tidal wave advances. The study of these phenomena, I may observe, is at the present time an object of special solicitude to the British Association, and that an application recently made to the Government for assistance in prosecuting researches into tidal phenomena has not been successful, arose, no doubt, from a want of due perception of their great physical importance. The ocean currents again, are due to the force of gravity put into operation by changes of temperature directly in case of the sea, or indirectly through the winds or changes of pressure in the case of the atmosphere. In all these intricate phenomena we find that the same two great powers of nature—heat and gravity—are the efficient causes at work, however various may be their precise modes of action, or the results to which they have given rise.

The examination of the land, and of the materials of which it is composed, brings us to the study of geology. By help of this science we may trace out the manner and time of the formation of the earthy or rocky deposits exposed to view on the surface, and explore in a partial manner the constitution of the subjacent strata of the crust of the globe: by it too, we may learn how and when the existing features of the earth's surface were impressed upon it; at what age of its history the continents and islands became dry land, the mountain chains were raised up, and the plains laid out; and how, in combination with these constructive agencies, a simultaneous incessant destructive action of the seas, of the rivers and other surface waters, has been carried on, tending, with more or less activity, to throw down the great monuments erected by the internal energies. By the light of geology we may, to some extent, ascertain the nature of the forces by which elevations of the surface have been caused, and the mechanical mode of their operation,

and so better obtain an insight into the essential natural relations of the mountains, the plains, and the valleys, the rivers, the lakes, and the seas. Such enquiries once more bring home to us the conviction, that the ever diversified details of the face of the globe on which we stand are in no true sense accidents, or the results of fortuitous chance, and as such, only worthy of being regarded with admiration by reason of their picturesque forms or their wonderful proportions; that they are, like all other works of nature, the direct, orderly, and necessary results of the action of forces, simple in themselves, and operating in accordance with well-known physical and mechanical laws. The perception of general characteristics of structure among the mountains, the plains, and the seas, that pass under our review, is indeed too often obscured and overshadowed by their magnitude, the multitude of their details, and the variety of their forms, which, by reason of their vastness, at first only produce impressions of hopeless confusion on the mind of every traveller or student; yet, when once the idea of their subordination to some common law is duly conceived, it will be found to receive confirmation at every fresh step we take.

From the solid mass of the earth we go on to observe the aërial covering with which it is surrounded. The extremely complicated phenomena which the atmosphere presents under the varying action of the light and heat radiated to the earth from the sun, supply the student with problems as difficult to investigate as they are numerous, and requiring for their solution the most ample knowledge of the laws that determine the action of the physical forces operative on inorganic matter. The diffusion of watery vapour in the atmosphere, and the variations of the temperature the pressure and density of the air thus charged with vapour, give rise to the great series of phenomena which are included under the general term climate. Of these the primary causes, whether of the changes of seasons, of the winds, or of rain, are the action and reaction of the mechanical and chemical forces set in operation by the sun's heat, varied from time to time, and from place to place, by the influence of geographical position and elevation above the sea, as well as by the condition of the surface, and possibly, too, by actual variations in the heating power of the sun itself, though of this we yet know too little to do more than refer to it as a possible cause of change. Position on the earth's surface in respect to latitude, combined with the diurnal and annual motions of the earth, are the conditions which determine the greater or less direct exposure of any place to solar radiation, and therefore the quantity of heat received there; elevation above the sea-level determines the density of the air, and the quantity of watery vapour it can contain, and, by reason of the laws of specific heat, the effect of the quantity of heat received at any place in determining the temperature of the air; while the condition or composition of the surface determines the degree of accumulation of heat, by reason of the varying power of absorbing or of radiating heat possessed by various substances. Further, the changes and motions set up by these forces are all liable to be modified under the laws of mechanical action, which govern an elastic fluid, like the atmosphere, distributed over the surface of a sphere itself in motion. Nor does this exhaust the elements of disturbance due to local conditions; for the mechanical action of ranges of mountains is of primary importance in determining the movements of masses of air on the earth's surface, and the numerous reactions consequent on those movements. The inequalities of the surface, which are insignificant when viewed in relation to the whole globe, are of the greatest importance in relation to the atmosphere. For, owing to the laws of elastic fluids, the great mass of the air and of the watery vapour it contains are concentrated very close to the surface. One-fourth of the air and one-half of the watery vapour are found below 8500 feet; one-half of the air and nine-

tenths of the vapour are below 19,000 feet, which hardly exceeds the average elevation of the highest ranges of the Himalaya; while three-fourths of the air is probably within reach of the influence of the highest masses of those mountains.

For the complete solution of the numerous problems that arise in connexion with atmospheric phenomena at any place, a comprehensive knowledge of all the local conditions is thus as essential as a knowledge of the fundamental physical laws which govern the forces more directly called into operation. And the final result of our investigations in this direction is to show that the whole character of the climate of any region may depend, not only on the conditions to which I first referred,—geographical position, elevation, and condition of surface—but as much, or even more, on such circumstances as the direction of the coast-line with reference to that of the earth's motion on its axis; the position of the locality with reference to the chief neighbouring areas of land and sea, whether, for instance, such areas be, respectively, to the east or west of it; the exact distribution of the elevated lands that occur within and around the region, alike with respect to position, direction, and altitude.

From the footing gained by means of such studies we are enabled to advance to the comprehension of the phenomena attending the distribution on the earth of living creatures, vegetable and animal. We have been led to see how, under the action of internal forces, extending into the remotest periods of the past, the surface of the earth has been moulded to its present form, and has received its present distribution of land and sea, of plain and mountain; how, by reason of this configuration of the surface, special characteristics of climate have been impressed on each different region; and how the local atmospheric conditions which fit the earth's surface for the support of life, or otherwise, have been brought about. As we proceed we shall continue to find that the same law of mutual interdependence prevails in all parts of the fabric of nature, animate as well as inanimate.

The phenomena of life, though, in all respects, subject to the same general mechanical and physical laws that are operative in the case of inorganic matter, are further complicated by the superposition of the vital force. Subject to the special laws of life, we find that living creatures are acted upon by the external conditions under which they exist, in a manner quite analagous to that in which inorganic matter obeys the influences to which it is subjected under varying circumstances in various places. Observation has proved that there exists one general system of life, vegetable and animal, which is co-extensive with the earth as it now is, and with the whole history of living creatures, carrying it back as far as we are able by the help of geological research. Within such a general system there are further found, as universally, special subordinate systems of living creatures occupying various localities under various external conditions; and, although we can speak less confidently of the external conditions in the past, the local variation of type is indicated as constantly in all former geological epochs, from which we can obtain any evidence, as it is now. The circumstances under which change of position on the earth's surface is found to be accompanied by variations of climatic condition, will as certainly be accompanied by variations in the living creatures upon it. Almost as universally, it may be said, that similarity of such conditions is accompanied by similarity of forms of life, and often it is complete identity that will be found.

Of the laws of life which regulate the extremely complex phenomena to which I am now referring, that which operates most directly in determining the character of the living creatures in any region, is the law of propagation by generation or descent. The immediate corollary of this law is that of geographical distribution around local centres, under which the animals and plants

of every locality tend to disseminate themselves to all neighbouring places. So far as the conditions of existence are favourable to such diffusion, it extends; and where they are incompatible, it ceases. It would carry me beyond the limits of my subject to enter in more detail into the secondary causes which determine the extent to which diffusion of life is possible, and all that I need further say on the subject is to offer a few remarks on the manner in which this law specially comes within the field of observation of the geographer.

The study of the plants and animals found to exist at any locality will more or less satisfactorily furnish the means of tracing back the stock from which each has sprung, and the regions of which they are specially characteristic, and in which they appear to have originated, and from which they appear to have been diffused. It will readily be seen that the considerations which arise in discussing such questions will involve a knowledge of the conditions of climate, using that term in its widest sense, peculiar to each locality and the countries adjacent to it, as well as of the changes which the earth's surface may have undergone during the period in which the diffusion of the races of living creatures which are the subjects of our researches has been going on, and the corresponding changes of climate which may probably have accompanied such changes of surface.

I shall not attempt to discuss any of the great and perplexing questions that meet us in our efforts to solve the mysteries which surround the origin of life on the earth, or of man among living beings. Neither need I dwell upon the special faculties and dispositions that distinguish man from other animals, and serve to complicate the efficient causes of the positions which are now occupied, and the influences now exercised on each other and on the material earth itself, by the various races of men on our globe. It will suffice if I state that everywhere we find the condition of man, and of the various groups and grades of beings in common with which he possesses the wonderful attribute of life, to be directly, and, in many cases, almost wholly, dependent on the physical characters of the regions which they severally occupy; that the multiform denizens of earth, air, and water, animal and vegetable, man, beast, bird, fish, or other living creature, the forests which clothe the mountain slopes, the pastures or harvests of the plains, the brilliant flowers of the alpine regions, the scanty covering of lichen which marks the last effort of vegetable life; each takes up its proper place, and retains possession of its own particular domain upon the earth, under laws which, whatever be their complication, are unfailing in their operation, and extend in their application, both in respect to space and time, as far as human observation has yet reached; and that, for the full apprehension of the value of each different series of such phenomena or facts, it becomes necessary to view them in combination, to perceive their mutual connexion, and to take in the idea of their forming a consistent and self-supporting whole.

Such, then, is my conception of the scope of scientific geography, and of the demands it makes upon us. That it may be difficult to realize this ideal in its completeness I will not deny; nor should I be surprised if it appear altogether unattainable to a generation that has not received even an elementary education in physical science. As education has till now been conducted, a man who becomes desirous of devoting himself to scientific exploration will commonly be in the position of one who, when entering on a literary career, should find it necessary to begin learning how to read and write. But I look forward with confidence to the results that will follow when every child is started in life with general, but correct, conceptions of the fundamental facts and laws of nature. A course of instruction, for instance, on such an admirable plan as that pursued by Mr. Hale, and explained to us by him at our last meeting, could not fail, if generally adopted, to turn out young men viewing the earth on which they live in a totally different spirit, and from a totally different stand-

point, from that of the present generation. And you will observe that this conception of scientific education, far from excluding the study of man and his history, mental and social, requires it as an indispensable portion of the knowledge of surrounding nature. A great statesman in his ignorance, and a little statesman in his insolence, may assume that men of science, as those who study physical science are commonly called, are disabled by their researches in the field of nature from comprehending and interpreting humanity. We, on the contrary, hold that there can be no true knowledge of man, without knowledge of that which is not man, and that it is only when he is viewed in his real position, as one amongst many phenomena, that any accurate conception can be formed of his powers and their limits.

As I before suggested, progress in science depends on the intelligent co-operation of inquirers in all its numerous branches, and my desire is now again to impress upon you that it is the proper function of the scientific geographer to bring together into a connected view the varied facts of nature, as analyzed and explained by the several classes of observers and thinkers who devote themselves to the special branches into which science divides itself. For success in such a task a knowledge of the results of those special branches of investigation is necessary, and in proportion as this knowledge is wide and complete will our power to cope with that task be increased.

The easy inference from all this is, that the more scientific education is extended, the greater will be the field from which to provide travellers possessed of the desired scientific qualifications, and the more rapid will be our progress towards the accumulation of the varied stock of knowledge required to complete a scientific body of geography. The labours of our illustrious countrymen Darwin and Joseph Hooker, who stand at the head of the scientific travellers of this, or perhaps of any time, and who have, I suppose, done more for the advancement of scientific geography than almost any men living, will serve as an example to show how great is the value to science, in all its branches, of the observations and explorations of travellers endowed with more than the ordinary share of scientific instruction. What these men, who have so justly earned the high title of philosopher, have done for our science, others may do, if they follow the same path.

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3. *On the Place of Geography in Education.** By the Rev. E. Hale, M.A., F.R.G.S., Assistant Master at Eton.

I am a schoolmaster—seeking rather for information than able to give it—hoping to awaken such interest in others who are skilled in scientific learning, that they will give the benefit of their ideas and more impartial judgment to its professional teachers, who are the obscure pioneers of what is probably a great educational movement.

Every man from his birth is brought into contact with his fellow-men and with Nature. Nature and Man should be, and are intended by the Creator to be, in harmony with each other. The great aim of education should be to teach the relations in which each man stands to Man and Nature,—to teach each man in such a way that he should be best fitted to fulfil his social duties, best fitted to understand and employ advantageously the forces and powers of Nature.

Since the days of the Greek philosophers until quite recently, all those who have taught, have (some perhaps unconsciously) had in view the idea of teaching

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the pupils their duties as citizens by means of a classical education, a system of education which, including not merely the languages, but also history and human philosophy, was, indeed, a liberal education, although a one-sided one. This was the original aim; but having to commence by teaching Latin and Greek before the great fathers of philosophy could be studied, their education degenerated into a mere teaching of two languages: a teaching, too, not carried on in a scientific or original manner, but by enforcing arbitrary rules of (so-called) grammar and by exercises in a forced and artificial style of composition; a system which (at any rate where education is confined to it) I contend is calculated to dwarf the mind and impair the reasoning faculty. For the young are natually inquisitive and eager for knowledge. In our intercourse with our own little children we see that daily. Now, this teaching of grammar—irksome to the majority of teachers, irksome to the majority of learners, preventing freedom of thought or play of intellect—was all the education afforded in our chief schools some forty years ago. Here and there mathematics were added, but modern languages and science were entirely ignored.

Recurring again to the aim of education to teach the young their relations to Man and Nature, or rather so to train them that they may be able to learn them for themselves, we see a system of education dividing itself into two branches—Human and Natural Philosophy;—the one taught by Literature and History, the other by Mathematics and Physics and Science. Whether Latin and Greek are the best means for teaching the former of these is not my business now to discuss. But we must bear in mind that school-education can be but rudimentary, but must be sound. Boys (and girls, too) should not be turned into superficial sciolists, but should have a good solid foundation given them on which to build their future knowledge. Certain rudiments should be taught them, knowing which, they should be able, branching one way or the other as their faculties or inclinations lead them, to devote themselves to their own peculiar study.

And these rudiments should be—a Language, either ancient or modern, besides their own; a certain amount of Mathematics, principally Arithmetic and elementary Geometry, or rather, perhaps, Geometrical Drawing,—the Arithmetic to give quickness and readiness, the Geometrical Drawing to teach form and shape; and Geography, Political and Physical,—the former being absolutely necessary to the study of the History of Man, the latter—Physical Geography (Erdkunde, as the Germans and Professor Huxley call it, Natural History as Mr. Wilson names it)—being nothing less than the History of Nature, the term by which I, with all due deference, would prefer it to be designated.

With this groundwork a pupil should afterwards be able to devote his attention more particularly to his own special study. But these things should be taught *thoroughly*. It is impossible to expect a boy of average abilities to learn well many things—it is injurious to him mentally and bodily to attempt it. And yet this is attempted. For I cannot too prominently bring before you the fact that in very many schools where science is taught, it is added to other studies—it has been pushed in forcibly—and often in a most perfunctory manner. One term a boy has a course of Mechanics, the next of Astronomy, the next of Chemistry, and so on. I hold that this is a great evil; injurious to all concerned, pupils as well as teachers. I wish to maintain that a good, solid, common foundation—some such a one as I have sketched out—should be given to all; and that then there should be two great divisions in a school,—the one Literary, the other Scientific and Mathematical.

I hold, then, the first object of school education should be to ground the young thoroughly, not superficially, in those elementary studies which may best fit the pupils afterwards to pursue their investigations into the History of, and the

laws which govern, Man and Nature. And I consider Geography in its broad sense, Political as well as Physical, to be one of these elementary studies, absolutely essential to the proper study of the History of Man and Nature. The upholders of the old system of education admitted this partly. For they made a point of teaching the political divisions of the world in the days of the supremacy of Greece and Rome, and they were glad if, in the nursery or under a governess, a boy had learnt the different countries of the world at the present time, and the names of their chief cities. But having myself for many years been a teacher of Modern History, I found boys absolutely ignorant of the commonest geographical facts, unable therefore to understand the political importance of treaties altering the boundaries of countries, or of the exchange of colonies; in fact, so badly grounded that they were unable to use with any advantage Historical Atlases, such as that of Spruner. Obviously a knowledge of Political Geography must precede the study of History.

But that Physical Geography should be the groundwork of science-teaching is not so obvious to all teachers. I ought, perhaps to have said before, that in all matters of practical teaching I advocate nothing that I have not myself personally tried. I spoke before of the inquisitiveness of children; every parent knows it well, and must have observed also how, after school-life begins, this inquisitiveness seems to vanish. My own opinion is, that it is generally stifled by the evil genii "Latin and Greek Grammar." Be that as it may, I know that this disappearance of inquisitiveness does not prove that it is dead. "With warmth and gentle rains it sprouts afresh." This stimulating power is afforded by Physical Geography. The first things the teacher will teach are the first principles of Astronomy,—the earth, its position in the solar system, the phenomena of day and night, summer and winter, eclipses and the changes of the moon. Boys generally become interested at once; the intellectual cravings of their very childhood again revive and are being satisfied. At the end of the very first lecture boys will remain behind, asking for further information—"Why is it?" Having, then, taught the first principles of Astronomy, the teacher will proceed to the first principles of Heat, to the effect of solar heat on the earth, tides, winds and currents, evaporation and rain. Thence he will proceed to the first principles of Geology,—to the changes in the physical features of the earth, to rivers and ice and volcanoes, to the formation of chalk and coral, to the distribution of plants and animals. And if at first the inquisitiveness of the learners is excited, at the end they first feel their intellectual powers. They see how, from the knowledge of certain facts, the great laws of Nature are deduced,—the spirit of the inquirer, of the discoverer, is aroused in them,—their reasoning faculties are now excited and strengthened.

Of course, generally speaking, boys who are the best in Classics and Mathematics are best also in Physical Geography, because they are boys whose natural abilities are above the average. But there are many exceptions. Boys, whose early training has been deficient, or who from some intellectual cause are unable to appreciate the refinements of grammar, suddenly awake, as it were, when first taught the principles causing the phenomena of Nature. And a great moral good is effected in them. I am one of those who hold that sports—Athletics—are of use as a means of moral as well as of bodily training, that many a thick-headed strong-limbed boy, by his excellence in sports is enabled to recover or maintain the self-respect he may have lost, or be in danger of losing; so, in like manner, the boy finds in the study of Nature, and in the fact that he may hold his own in this study, a means of preserving his self-esteem. An objection strikes me may be made against the study of Physical Geography, that it is too discursive. I have insisted on a boy's training being thorough, and at the same time have praised the study of Physical Geography as being introductory to so many sciences. But there is

nothing really contradictory in this. The want of thoroughness is seen when boys are successively put through courses of Astronomy, Chemistry, Mechanics, &c. Anything like a thorough knowledge of these sciences, or of any one of them, cannot be imparted to a boy. Astronomy and Mechanics, for instance, if exhaustively studied, require a large knowledge of Mathematics,—much larger than that possessed by the great majority of boys. But the first principles of those sciences necessary to the study of Nature, such as Astronomy, Heat, Geology, Zoology, may be throughly taught, and can be perfectly understood by a boy of fair intelligence. Again, discursiveness is not opposed to thoroughness, and the discursiveness of Physical Geography is a positive advantage to the teacher. One of the great benefits which a large school affords to boys, is that they are brought into contact with so many different minds, they are subjected to the influences of so many different teachers. So the science teacher who is instructing his boys in Physical Geography will naturally dwell at greater length on his own *specialité*, will bring much peculiar knowledge to bear in illustrating all those natural phenomena which relate more particularly to his own branch of science. And on this I found another reason for making Geography or the History of Nature the foundation of all science-teaching in schools.

I will briefly mention the method I employ in teaching Physical Geography, premising that I by no means insist on it as the best method. I have had good results from it, but doubtless a better method would have produced still better results. At the same time, I must claim this indulgence for science-teachers from adverse criticism. Classical teachers have the experience of centuries to guide them. The method of science-teaching in schools must be regarded as tentative; as I before said, the teachers of the present day are but the pioneers of the educational army which will eventually, I believe, overcome the ignorance of "common things" displayed so universally, and put to flight the host of Philistines who rejoice that their children's intellects are kept in the same state of bondage as their own.

My class consists of about thirty boys. I give them no *text-book*; and on this, I may say, I place great importance. Each boy has one of Keith Johnston's School Atlases of Physical Geography, price 10*s.* 6*d.* The teacher, I presume to be conversant with Humboldt, Herschel, Tyndall, Murchison, and Reclus; and to know Sir C. Lyell's 'Principles' thoroughly. My references are principally to these authors, and my "stock in trade" consists of wall maps, photographs, and a microscope in my study, for the more eager pupils. I ought to have also a good geological museum. This is at present in course of formation, and when the school authorities will grant a suitable room, will be speedily in working order. I require each boy to bring in a large note-book, with each page folded in the middle. I commence my lecture by stating first what is the more immediate subject of my lecture; then I dictate from my own notes an abstract of the first division of my lecture—this abstract each boy writes on one half of the folded page. I then enlarge and illustrate by facts, putting at the same time frequent questions to the boys. On the other half of the page each boy takes as many or as few notes as he pleases. At the end of the lecture, which lasts somewhat less than three-quarters of an hour, I refer the pupils to authors, and the chapters of their books which treat more at length of the subject. Only the more industrious boys refer to these. If possible, I show a photograph or picture of some well-known or often described place, which may serve to illustrate the lecture. After my two lectures (two lectures are given weekly) I require each boy to bring an abstract of the lectures, not copied verbatim from his note-book. I give marks for these, and also additional marks for good diagrams. After every eight or ten lectures an examination-

paper is set, and I give a prize to the boy whose aggregate marks for abstracts and papers are highest.

I feel that a most valuable addition to my lectures would be some kind of field instruction—such as I hope to hear mentioned by the President—which should include the teaching practically the use of instruments—and also should admit of those excursions, geological, botanical, or zoological, so common in German schools.

Now, I believe, that independently of the knowledge acquired by the boys, the mental training is by no means despicable, which shows them, first, how to analyse a lecture or a book, as the abstract dictated to them does; and secondly teaches them, as their original abstract does, how to reproduce in their own language the lectures they hear. And this is part of the thoroughness of teaching which I insist on.

One other objection I have heard urged against geography, that it is a subject easily "crammed up," I may here answer. The result of competitive examinations is doubtless to encourage a system of cramming. If a pupil is not intended for a competitive examination, I hold that my method is the farthest possible removed from cramming; but if a pupil be intended for a competition, the question arises will he be able to pass well. I have faith that he would, and the only two competitive examinations pupils of mine have gone in for they have done satisfactorily. But I hold that geography, if the examination papers are set with the same discrimination as those set in the Royal Geographical Society's examinations, cannot be crammed up. There are two great desiderata in an examination paper: first, to give problems; secondly to give full marks for a certain portion of the paper answered well, *i.e.* to encourage a thorough knowledge of some parts of a subject. Fortunately, then, Geography is so discursive; and fortunately problems can be set—Given certain conditions, what will result?—Given certain facts, what laws would you deduce? But my own experience teaches me this—that Mathematics admit of more "cramming" than any other study; and yet who would refrain from examining in Mathematics, because they admit of being crammed? I trust the time is not far distant when every boy in those schools professing to lay the foundations of a liberal education will be at least as conversant with geography, both Political and Physical,—the one the necessary introduction to the history of Man, as the other is to the history of Nature—will, I say, be as conversant with geography, as they now are supposed to be with the Latin Grammar.

INDEX

TO

VOLUME THE SIXTEENTH.

"Abadees" or settlements of Mekran, 140.
Abdul Rahman Khan, 257.
Abian, 118.
Abydos, the, 203, 242, 373, 415.
Aden, explorations near, by Wrède, 115.
Adkins, Mr. T., 351.
Admiralty Surveys, 315 *et seq.*
Afghan, the, description of, 396.
African rivers, curious fact as to their embouchures, 101.
Agassiz, Prof., deep-sea investigations of, 331.
Aggis people, 172.
Ainos, race of, 189, 192, 358.
Akăyŏng tribe, 136, 137.
Akis, quaisho at, 190.
Aksu, position of, 243.
Akrabee, State of the, 120.
Alcock, Sir R., on Manchuria, 213.
Alexander the Great, 139, 219, 220, 221.
Alsadamus Mons, of Ptolemy, 105.
Alexis, Grand Duke, Arctic Voyage of, 86.
Altazimuth instruments, on observations with, by Col. J. T. Walker, 32; manipulation of, 36.
Amabaga, kraal of, 95.
Amanus, Mount, 336.
Amatonga tribe, 96, 98.
Amazon Valley, Geographical Positions in the, by Mr. I. H. Rochelle, 271-274.
Ambrym, volcanic island of, 389, 391.
Ameers, State of the, 119.
America, South, 358.
American Geographical Society, 329.
Amur River, loss of, by the Chinese, 214.
Anatolia, North-eastern, Tour in, by Mr. W. G. Palgrave, 223 *et seq.*
Anderson, Dr. John, 347.
Andrews, Mr., 337.
Aneiteum, island, 394.
Aneroid, use of the, 26.
Angouah, *Boswellia papyrifera*, 154.
Anigour character, 215.
Annatom, island, 389.
Anping, port of, 271.
Antiaris, poison of, 178.
Antwerp, International Congress of Geographers at, 83, 132 *et seq.*
Ape's Hill Harbour, 271.
Apes, no link connecting with the genus homo, 177.
Apollonius, account of pepper-cultivating apes by, 178.
Arabia, Southern, Baron von Maltzan on the Geography of, 115 *et seq.*
Archdeacon, Nav.-Lieut., 318.
Arctic Exploration, 85, 227 *et seq.*, 360.
—— Regions, vegetation of, 236.
Arpatallak Mountains, 246.
Artali Volcano, 128.
Arz el Jahashshiyyah, 112.
Asalah, town, 118.
Asia, Central, mountain systems of, 397.
—— Minor, researches in, 334.
——, Russian, 348.
——, Western, projected map of, 336.
Asses, wild, herds of, 262.
Astrolabe, French corvette, 390.
Atalik-Ghâzi, 404, 407.
Atara, 118.
Atzis, or bark-cloth, 192.
Australia, first discovery of, 352; probable French discovery of, 353; telegraph line across, 355.
——, South, coast survey of, 319.
Avanchers, M. Léon des, 127.
Ayn Kasam, "Hill of an Oath," 113.
Azimuth, observations for, 17.

Baa Kaazim people, 117.
Bab-el-Mandeb, 120.
Back, Adm. Sir George, 158; on mode of carrying chronometers, 24; on Polar exploration, 235.
Backasey Gap, 136.
Badakshân, jewellers of, 396.
Badger, Rev. G. P., on the Somâlis, 156.
Badgley, Capt., 345.
Bagamoyo, 414, 416, 425, 434.
Bagh-i-Dilkhusha, the, 261.
Baharini, position of, 128.

Bakai fishing-station, 195.
Baker, Sir S., 162, 187, 365, 418.
——, Sir Wm., acknowledgment of award of Medal in behalf of Col. Yule, 280.
Bakshee Ram, 398.
Balgetter Valley, 140.
Ball, Mr., on the unreliableness of native geographical information, 131; on the niggardliness of the Treasury, 165.
Bangweolo, Lake, 413, 435, 438.
Banians, encouragement of slave-trade by, 434, 437, 438, 441.
Baobab trees, enormous bulk of, 97.
Bara, 170.
Baringo, fresh-water lake, 128, 439; the Barenca of Mercator, 130.
Barometers and their substitutes, 25.
Barrents, Dutch navigator, relics of, 361, 362.
Barth, Dr., 160.
Basango, highlands of, 438.
Base lines, method of attaining, 18.
Basevi, Capt. J. P., obituary notice, 306.
Bassos Tower, the "Saccæ" of Ptolemy, 105.
Bashpah, the, character of, 215.
Bates, Mr. H. W., on Collection of Objects of Natural History, 67.
Bathang, French missionaries shut up in, 396.
Baÿdha, town, 119.
Baÿhaun, city, 119.
Beatrice, the, 319.
Beaupré Isles, 390, 393.
Bedawi, power of, in Western Asia, 109.
Beer Ahmed, village, 120.
Becroft, Capt., 136.
Beila, the ancient Armail or Arman-abileh, 219.
Bëla, 140.
Belcher, Adm. Sir E., 390; on silvering sextant glasses, 17.
Belgium Government Survey, excellence of the, 134.
Belooches, the, 219.
Belut Tagh of Humboldt, 399.
Benee Hamad tribe, 121.
Ben-si-Khu Mountains, coal of, 210.
Benoni River, 172.
Berbice River, 360.
Betel-nut chewing, 269.
Birdwood, Dr., 154, 155, 156.
Bisayas people, 176.
Bishni, village, 263.
Bligh, Capt., 390.
Bima poison, 175.
Blakiston, Capt. T., on the Island of Yezo, 89, 188 *et seq.*; 357.
Blanford, Mr. W. T., 347.
Bogdo-Khan, 211.
Bo-hai princes, 207.
Polor, mystery of the locality of, 245.
—— Range, 398, 400.
Bombay, Governor of, telegram from, relating to Dr. Livingstone, 410.
Bona Vista Bay, soundings in, 319.
Bonna, Wadee, 118.
Boswellia, species of, 154.
Bougainville, M. de, expedition of, 389.
Brahoois, the, 219.
Brâk town, Burák, or "the Cisterns," 105.
Brandis, Dr., 178.
Brazil, H.M. the Emperor of, 133.
Brenner, Mr., travels of, 127.
British Association, Edinburgh meeting of the, 83.
—— Guiana, soundings on coast of, 318.
—— Lahaul, Province of, 402.
Brodie, Mr. Walter, on the Livingstone Search and Relief Expedition, 148.
Brodrick, Hon. G. C., on the Public Schools Prize Medals, 289.
Brown, Dr., 133.
——, Mr. C. B., 359.
Bruce, 152, 154.
Buddhist idol temple of the "Defender of the Faith," 210.
Bunder Marayah, 149, 150.
Burel Somâl country, 153.
Burton, Capt., 87, 89, 127, 334, 380; Exploration of the Tulúl el Safá, Volcanic Region East of Damascus and the Umm Nírán Cave, 104 *et seq.*; on exploration in Southern Arabia, 122; on the Ukara or Ukerewe Lake of Equatorial Africa, 129 *et seq.*
Burukinegge Land, 439.
Bushell, Rev. R., 168.
But-khans, trappers and hunters, 211.
Byron Bay, duel mode of fighting at, 392.

Calabar and Cross Rivers, Capt. J. B. Walker, on, 135 *et seq.*
Calver, Staff-Capt. E. K., 315, 322.
Carlsen, Elling, Norwegian captain, 361, 362.
Caroline Islands, swarming of the natives from, 393.
Carpenter, Dr., 84; investigation of oceanic currents by, 323.
Cartaret, Capt. P., 389.
Carter, Dr., 154.
Cathay, corruption of Kitau, 214.
Caucasus, the Indian, 261.
Cazembe, chief, 159; Town of, 413.
Cedar Block, the, 106.
Central Asia in 1872, account of, by Mr. R. B. Shaw, 395 *et seq.*; mountain systems of, 397.
Chagga, 167.
Chaix, Prof. Paul, 328.
Chala Lake, 170, 367.
Chambeze River, error in calling it the Zambese, 438.

Chang-po-shan, or "Long White Mountains," 207, 208.
Chapman, Mr., 346.
———, Mr. J., obituary notice, 314.
Charchand, elevation of, 403; River, 404.
Charura, Basañgo chief, 439.
Chavica Betle, betel-pepper, 270.
Cherry Island, 390.
Cherry-trees, forests of, 262.
Chesney, Gen. F. R., obituary notice, 301.
Cheu-sian-laoe, the guardian spirit of children, 211.
Chia-Siang, town, 266, 267.
Chiptyk Pass, 350.
China, Great Wall of, 208.
Chinamen turned Mussulmen, 396.
Chinese, curious superstition of, as to mountains, 210.
Chitral, position of, 259; River, source of, in a glacier, 261.
——— to Faizabad, a "Havildar's" Journey through, 253 *et seq.*
Christie, Capt., 219.
Chronometers, how to carry, by Adm. Sir George Back, 24.
Church, Col. G. E., 359.
Clyde, Lord, saying of, 149.
Coal found in Manchuria, 210, 215; in Japan, 215; in the Yarkand plains, 406; in the hills near the Jaxartes, 409.
Coffee, growth of, in Arabia, 118.
Collinson, Adm., 165.
Compasses: Prismatic, 20; Pocket, 21; keeping water-tight, 24.
Constance schooner, 346.
Cook, Capt., 389, 394.
Cope, Mr. Walter, obituary notice, 315.
Coral formation, theory of, 394.
Corean Buddhists, miraculous deity of, 208.
Coreans, empire of the, 207.
Coventyn River, headwaters of, 360.
Corsali, Andrea, Florentine navigator, 354.
Couriers of Manchuria, 212.
Crespigny, Lieut. C. de, on Northern Borneo, 171 *et seq.*
Cruttenden, Lieut., 122, 152, 153, 154.
Cubic feet of water conveyed by a river per second, to measure, 65.
Cunningham, Gen., 246, 402.
Curaçoa, the, 391.
Curtis, Port, 320.

Daigul, village, 256.
Dakwah Mountain, 114.
Dallas, Mr., 165.
Damascus, exploration of Volcanic Region east of, 104 *et seq.*
Dana River, 127.
Darwinian theory, living testimony in favour of, 95, 435; of coral-reef formation, 394.
Dawson, Lieut., 157, 161, 166, 321, 381, 410, 416, 419, 421, 428, 430, 431, 432.
Davia Salam, Turkish steamer, 381.
De Saulcy, 114.
Decken, Baron von der, 127, 128.
Defoe, romance of 'The Adventures of Captain Singleton,' geographical accuracy of, 99, 101.
Dehbid range, 263.
D'Entrecasteaux, expedition of, 390.
Derb el Ghazawát, "Road of Razzias," 114.
Deria Numuk, salt lake, 262.
Derjanj, town, 118.
Denham, Capt., 391.
Dhaker, town, 117.
Dhiban, monolith of, 333.
Dhumayr, village, 114.
Dillon, Capt. Peter, 390.
Disco, fossil leaves of, 236.
Dodeh, 261.
Dóenyo Ngái, Mount, 128.
Doo Mohammed, conquerors of Yemen, 120.
Dora Pass, 257, 258, 259.
Dragomans, difficulty of dealing with, 131.
Drake, Mr. C. F. Tyrwhitt, 104, 332.
Drew, Mr. F., 409.
Dubla Sertkol Desert, 246.
Duff, missionary ship, 390.
Duke Town, capital of the Calabar people, 136.
D'Urville, Durmont, 390.
Dusht Khor River, 140.
Dutton, Mr. F. S., 149.
Dzungaria, Province of, 261.

Eastern Archipelago, survey of, 321.
Ebir, tribe of jugglers, 152.
Edwards, Capt., 390.
Efiat, "Tom Shots' Point," origin of name, 136.
Eflk, or Old Calabar River, 135.
Egyptian army destroyed by the Druzes, 114.
El Hamdanee, Arabic work on geography by, 116, 120.
El Hármiyyah, 109.
El Harrah, the "Hot" or "Burnt Land," 108.
El Hauta, oasis, 116.
El Hazm, 108.
El Howta, capital of Lahej, 119.
El Nabash depression, 110.
El Odaysiyyeh, 109.
El Orr, battle of, 118.
El Zirs, 111.
Ellenborough, Earl of, obituary notice, 313.
Elton, Capt., Exploration of the River Limpopo by, 89 *et seq.*, 368.
Emshin Dagh, mountain, 223.
Eredia, Manoel Godinho de, reputed first discoverer of Australia, 352.
Erhardt, M., 126.
Er-Radaah, town, 122.
Erromango, island, 389, 391; singular absence of canoes in, 394.
Erskine, Capt., 391.

Erskine, Mr. St. Vincent, 97, 98.
Erzinghian, town, 223.
Esperito Santo, 389.
Essequibo River, headwaters of, 360.
Ethiope, steamer, 137.
Euphrates Desert, unexplored, 109.
Execution, mode of, in Badakshan, 257.

Faizabad, 257.
Fedchenko, M., 350.
Fiji Islands, cotton cultivation in, 391; admixture of languages in, 393.
Findlay, Mr. A. G., 411.
Finé, Oronce, astronomer and cartographer, 353.
Finger-nails as trophies, 176.
Fipa, 438.
Forests, ancient, of the Arctic Regions, 237.
Formosa, Island of, 357.
———, South, climate of, 271.
France, excellence of the elementary geographical works of, 134.
Franklin, 158.
Frankincense, 151, 154.
Freeman, abandonment of the, on the Limpopo River, 93.
Frere, Mr., on the East Coast of Africa, 101; on Manchuria, 216.
——, Sir Bartle, on Capt. Elton's Limpopo exploration, 99; on Mekran, 220.
Friendly Islands, people of, 394.
Frodsham, Messrs., 163.
Fudhlee territory and tribe, 117.

Galton, Mr. F., on sextant observations, 16; on rough triangulation without instruments, 63; on the Limpopo River, and the geographical labours of Sir R. Murchison, 100; on the uncertainty of native geographical information, 130.
Garawa, or Ukara, Lake, 130.
Garnier, Lieut., 133.
Gedrosia of Alexander and the Greeks, 139, 219, 221.
Genghis Khan, 217.
'Geographische Mittheilungen,' Dr. Petermann's, 229, 325.
Geography, on the Place of, in Education, by the Rev. E. Hale, 450 *et seq.*
George, Rev. H. B., on Photography for Travellers, 51.
——, Staff-Commander, Horizon invented by, 19; Hints on the projection of Routes, 53.
"Ghadir," hollows of stagnant water, 109.
Ghadir Abu Sarwal, "Hollow of the Father of Breeches," 109.
——— el Ka'al, 110.
Ghoder, Owdalee capital, 117.
Gillies Land, 231, 234.
Gillman, Prof., 329.
Gipsies, Mekran the home of the, 221.
Girin-ula, or Sungari River, 205.
Girdlestone, Mr., 346.
Ghareeÿa, town, 120.
Glacier of the Hindoo Koosh, 256.
Gnambua, 170.
Gobi Desert, 404.
Gold in Manchuria, 215; in Central Asia, 244; on the Upper Indus, 401.
Goldsmid, Gen., 139, 218.
———, Sir F., 87.
Gorgoza, Señor, 133.
Goschen, Mr., 235.
Gowland, Nav.-Lieut., 320.
Grant, Capt., 219.
——, Lieut.-Col., 387, 410.
Granville, Lord, letters of, to Sultan of Zanzibar and Dr. Kirk, in behalf of the Livingstone Search and Relief Expedition, 185, 186.
Greenland, flora of, 236.
"Grosser lavastrom" of Dr. Wetzstein non-existent, 105.
Grote, Mr. G., obituary notice, 312.
Guardafui, Cape, origin of name, 152.

Habban, capital of the Upper Wahidee, 116.
Habîb Jemayyil, Syrian youth, 107.
"Hadramaut," meaning of, 122.
Hafoon, Aphoné of the 'Periplus,' 153.
———, table-land of, 152.
Haji, Yârkand, sociability of the, 397.
Hajjee-koi, mines of, 223.
Hakkas tribe, 265, 266.
Hakêr, Wady, 150.
Hakodadi, 188.
Hale, Rev. E., on the Place of Geography in Education, 450 *et seq.*
Hall, Adm., on the Limpopo River, 100.
——, Capt., American Polar Expedition under, 85.
——, Staff-Commander D., survey by, 317.
Harris, Mr., survey by, 346.
Hasan, Wadee, 118.
Hauran Valley, 105; Mountain, 105, 106.
Hauranic architecture, 107.
Havannah, the, 391.
"Havildar," Journey of a, through Chitral to Faizabad, 253 *et seq.*; Route of the, 339.
Hayden, Dr. F. V., 330.
Hazelius, Johan August, obituary notice, 299.
Heer, Prof. O., 236.
Heine, Gen., 133.
Henderson, Dr., 406.
Henn, Lieut., 420, 422, 423, 436.
Herald, surveying ship, 391.
Hayward, Mr., 260.
'High Tartary,' Mr. Shaw's, 340.
Hippopotamus, dying struggle of, 97.
Himalayas, the, 407.
Himyaritic inscriptions, 156.

Hindoo-koosh range, 256.
Hing-King, sacred city, 211.
Hinka, Lake of, gold in, 215.
Hints to Travellers, 1–78.
Hisn-Ghorâb, Himyaritic inscriptions at, 156.
Hojree tribe, 121.
Holcus beer, 95.
Holland, Rev. F. W., on paper squeezes, 66.
Holy Perfume of the Bible, 155.
Homem, Diogo, 354.
Hong-kang, village, 266.
Hooker, Dr., on the vegetation of the Arctic regions, 236.
Hope Island, 232.
Hor tribe, 402.
Horizon, artificial, 19.
Horn, Mr., shipwreck of, 266.
Houghton, Dr., 123.
Howair, Wadee, 117.
Hughes, Mr. T. F., Visit to the Formosan chief Tok-e-Tok, 265 *et seq.*; 357.
Humboldt, 397, 400, 407, 408, 409.
Hunt, Capt. and Mrs., massacre of, 265.
Hunter River, 320.
Huxley, Prof., 269.
Hwen Tsang, 246.
Hyacinth, Archimandrite, 215, 216.

Ibokee, 136.
Ice-haven, relics of Barrents and his shipwrecked crew in, 361.
Ichthyophagi, 219.
Idol, Arabian, 122.
Ikorofiong, town, 137.
Ikunetu, 137.
Inanam River, 172.
India, proposed railway to, 337.
Indian Trigonometrical Survey, 343.
Inkpara, village, 136.
Inyak Island, 101.
Iran, mountain system of, 263.
Iskari River, 195, 200; mouth of, 197.
Italian Geographical Society, 328.
Iwu Liui Mountains, 209.

Jade-stone of the Charchand, 244.
Jaeel, Wady, 149, 153.
James, Major-Gen. Sir H., 134.
Janbiyyah, dagger, 121.
Japan, 357; steam machinery used in coal-getting, 215.
'Jareeret-el-Arab,' Arabic geographical work, 116.
"Jave la Grande," name given to Australia in old French MS. maps, 353.
Jaxartes River, coal found near, 409.
Jaydúr district, the ancient Ituræa, decayed condition of, 107.
Jayrud-Palmyra Valley, 108.
Jebel Durúz Haurán, 106.
—— Hauran, central ridge of, 106.
—— Kaur, 117.
Jebel Marayah, 150.
—— Merrais, 120.
—— Shamsham, volcanic rock, 116.
—— Tchauf, 120.
Jehandar Shah, 257.
Jen Khuan Wang, Prince of Kitan, 210.
Jewni, 139.
Jipi, Lake, 168.
Jogi, Indian fanatic, 397.
Johnston, Dr. Keith, 83; obituary notice, 304.
———, Mr. Keith, Notes on Rev. T. Wakefield's Map of the Lake Region of Eastern Africa, 125 *et seq.*; 367.
Jones, Capt. Felix, 336.
Josephus, 112.
Jow, 140.
Jupiter, French exploring vessel, 391.

Kaat-tree, importance of the, 120, 121.
Kabalán el Kala'áni, Druze chief, 107.
Kala'at Kasam, "Fort of an Oath," 113.
Kaleh-i-dokhter Fort, 263.
Kalmâks, the, 244.
Kamolondo Lake, 435.
Kanawát, the ancient Kenath or Canatha, 105.
Kándar gum, 156; Mountains, 246.
Kane, Dr., 236.
Kansuh, province of, 396.
Kappa, gold-field, 244.
Kara-Hissar, mineral district of, 223.
Karakash River, 401.
Karakorum Mountains, 399, 408.
Karashahr, 404.
Kasr el Hayr River, 108.
Kasze, or fish-manure, 196.
Katanga, copper-mines of, 438.
Kavirondo, Lake, 439.
Kawang River, 172.
Kej "settlement," not a town, 140.
—— Valley, 139, 221.
Kelkeet Plateau, 223.
Keller, Messrs., 358.
Kenia, Mount, 127.
Kerman, 263; Valley, 263.
Kerr, Staff-Commander J. H., 319.
Khabis, position of, 263.
Khairabad, 263.
Khartoom, railway to, 366.
Khedivé, the, 366.
Khin-an Mountains, 205, 206.
Khirbat el Bayza, 109.
Khor Dusht Plateau, 139.
Khubber, 117.
Khushnagan Hills, 262.
Kidette, arm of Lake Victoria, 439.
Kilima-Njaro, Mount, 126; snow on, 169 ascent of, 367.
Kimanis River, 172.
Kinarut River, 172.
Kin, or Golden dynasty, 208.

King Charles Land, 232, 234.
Kirk, Dr., on outfit for travellers, 12; letters from, relating to Dr. Livingstone, 102, 103, 225, 375, 383, 384, 386, 436; services of, to Mr. W. O. Livingstone, 425; letter from Rev. C. New to, 428.
Kisigau, 168.
Knobnuizen, a wretched specimen of humanity, 95.
Koa-luts, wild, massacre by, 265, 268.
Koh Rud Hills, 263.
Köijoes, tribe of, 176.
Kokcha River, 256.
Kokumi hot spring, 202.
Kolat Dagh, 223.
Koldewey, Capt., 239.
Kolwah Province, 140.
Komanotaki Volcano, 201.
König Karl Land, 85.
Koomb-i-Shireen Pool, romantic tradition relating to the, 141.
Koondah Mountains, 138.
Koran, ridicule of Arabian idolatry in, 122.
Koreans, character of, 216.
Kotro Valley, 262.
Kowalevsky, M., 351.
Krá'a lava-torrent, 108.
Kublai Khan, 206.
Kuen-luen range, 244, 397, 403, 407, 408.
Kulayb Mountain, 105, 106.
Kulja district, 404, 405.
Kwaja Mali Hills, 262.
Kwan-tung, 209.
Kwang-ning-shan Range, 209.
Kwan-ti, deity of Manchuria, 211.

"Labour" traffic, iniquities of the, 391.
Ladâk, ex-Raja of, 402; town of, 396.
Lahej State, 119.
Lake Region and South-East Africa, geography of, 367.
'Lake Regions,' Capt. Burton's, 129.
Lâma of Great Tibet, 396.
Lamont, Mr., Polar Expedition of, 85.
Lanchu, town, 244, 245.
La Perouse, shipwreck of, 390.
Le Gendre, Gen., 265, 266.
Le Mignon, Capt., 390.
Leichhardt, traces of his lost party, 224.
Leja, "Argob" of the Hebrews, 105.
Lepreux, l'Ile de, 389.
Lhassa tea-merchant, the, 396.
Liakhov Islands, 238.
Liau-tung, 210.
Lichfield, Bishop of, on the islanders of the South-West Pacific, 393.
Lifu, island, 393; reef formation of, 394.
Lightning, surveying vessel, 316.
Limpopo River, Capt. Elton's Exploration of, 89 *et seq.*; Falls of, 91.
Lincoln, Lake, 435, 438.
Livingstone, Dr., painful suspense as to his position, 88; letters of Dr. Kirk, relating to, 102, 103, 225, 375, 383, 384, 386, 436; Capt. Burton's confidence in his overcoming all obstacles, 104; medal awarded to, at Antwerp, 134; authentic intelligence as to his safety, 379; telegram relating to, from the Governor of Bombay, 410; letters of, to Sir R. Murchison, 433, to Earl Granville, 437, to Sir Bartle Frere, 440.
———, Mr. W. Oswell, 158, 161, 416, 421, 424, 436, 437.
——— Search and Relief Expedition, 124, 145, 158, 163, 184, 203, 225, 241, 369-377, 379, 387, 410 *et seq.*
———, Documents relating to:—1st Report of the Committee to the Subscribers, 413; Instructions to Lieut. Dawson, 417; Official Report of Lieut. Dawson, 419; Lieut. Dawson's Instructions to Lieut. Henn, 421; Lieut. Henn's Instructions to Mr. W. Oswell Livingstone, 422; Official Report of Lieut. Henn, 423; Resignation of Rev. C. New, 423, *note*; Official Report of Mr. W. O. Livingstone, 424; balance sheets, 426, 427, 442; Agreement between Rev. C. New and Lieut. Dawson, 428; Letters of Rev. C. New to Dr. Kirk, 428, 429; Letter o Thanks to Mr. Stanley, 429; 2nd Report of the Committee, 430; Questions put to Lieut. Dawson, 430; his Replies, 431; Judgment of the Committee, 432; Letter from Dr. Livingstone to Sir R. Murchison, 433; Letter from Dr. Kirk to Earl Granville, 436; Letters from Dr. Livingstone to Earl Granville, 437, and Sir Bartle Frere, 440.
Lob, Lake, 403.
Lockhart, Mr., on Manchuria, 214.
Lohf, ruins of the northern Túlul el Safá, 110.
Loirez range, 262.
"Loma," Spanish term for hill-brow, 108.
Lomame River, 435, 438, 440.
London Missionary Society, 391.
——— University, liberality of, in permitting the use of their Theatre to the Society, 82, 291, 412.
Loong-kiao Bay, 265, 267.
Loories, or Loulles, the primitive gipsies, 222.
Looshais, expedition to punish raids of, 86.
Lopevi Volcano, 391.
Lorenço Marques, 98; trade of, 99.
Lotko, 258.
Lovett, Major B., 87; Survey of Perso-Kelat Frontier, 219; on Route from Shiraz to Bam, 261 *et seq.*
Lyall, Dr., 236.
Lynn Wash, survey of, 316.
Lualaba River, position of, 439.
Lubân, or Lubon-tree, frankincense the produce of, 151, 156.

Ludha Damji, 434, 437.
Ludwig von ——, the fictitious, 245.
Lufira River, 440.
Lus-Beyla Province, 140
Lushani robber-tribe, 262.
Lutzun, German traveller, 120.

Maab, town, 118.
Maan, town, 118.
MacGregor, Lieut.-Col., 347.
Mack, Capt., 234.
Maclay, M. Miklouka, Russian savant, 356.
Maclear, Sir Thomas, 441.
Macqueen, Mr., 131.
Madeira River, 358.
Madumelan, chief, 96.
Mafelagure's village, 91.
Magdala captives, mode of communicating with, 125.
Mahmood Shah, 257.
Mahommed Kazamani, 113.
Mahrah tribes, language of, 115.
Major, Mr., 352.
Makalaka tribe, character, huts, &c., of, 90.
Mal Paiz, 105.
Malate, 168.
Malcolm, Sir John, 219.
Mallicollo, island, 392.
Maloios, kraal of, 95.
Maltzan, Baron von, on the Geography of Southern Arabia, 115 *et seq.*; 335.
Manati tribe, 136.
Manakoso, town, 159, 162.
Manchuria, Palladius' Journey through, 204 *et seq.*; researches in, 351.
Manchus, conquest of China by, 213; characteristics of, 216; feudal system of, 208; language of, becoming obsolete, 207; written language of, 215.
Mandara, King, 169.
Mange, or king, 169.
Mann, Dr. R. J., on Sand Bars at the Mouths of South African Rivers, 138, 139.
Manoa River, 204.
Mansita, 118.
Mantszi immigrants in Manchuria, 206.
Manyuema, the, 438.
Marango, 169.
Marayah, Wady, 155.
Marco Polo, 243, 244, 246, 400; Col. Yule's 'Marco Polo,' 216, 339.
Mare Island, 393; reef formation of, 394.
Markha Plain, 117.
Markham, Mr. C. R., on Dr. Mann's Observations on Sand Bars at Mouths of South African Rivers, 138, 139; on the Livingstone Search and Relief Expedition, 158 *et seq.*
——, Mr. J., obituary notice, 311.
Mary A. Way, the, 421.
Mas'dam, or Wade Tobbaan, 119.
Mastabahs, flat benches of cut rock, 111
Ma-tse, or horse-robbers, 207.
Mauch, Herr Karl, honorarium awarded to, 285.
Maydell, Baron, 351.
Mazitu, the, 439.
M'Clintock, Sir L., 158; on Arctic exploration, 238.
M'Ivor, Mr., 138.
Meadows, Consul, 213, 214, 215.
Medals, &c., annual award of, 278-290; award of Medal to Mr. H. M. Stanley, 441.
Mediterranean, the Eastern Desert an extinct, 108.
Mehai'daan Plain, 119.
Mekran, etymology of, 219; description of, 220; Journey through, by Major E. C. Ross, 139–141, 219 *et seq.*
Melanesian Mission, 391.
Melinde, pillar at, to Vasco de Gama, 126.
Membakut River, 172.
Menggatal River, 172.
Mercator, birthplace of, 135, 354.
Mercator's projection, mode of constructing a map on, 55.
Meteorological observations, hints on, 45.
Mias, or ourang-outangs, 176; domesticated, 178.
Middendorf, Von, Polar exploration by, 86.
Midgân, servant tribe, 152.
Mijjertheyn tribe, 150.
Miles, Capt. S. B., on the Somali Country, 149 *et seq.*
Millingen, Dr., 122.
——, Major, on Asia Minor and its brigands, 223, 335.
Ming dynasty in China, 207.
Mir Walli, Hayward's murderer, 257, 258, 261.
Miri, fort, tradition of, 140.
Mitre Island, 390.
Moche, 169.
Moculla, 151.
Moero Lake, 435.
Mohammed bin Gharib, 385.
Mokha, port for coffee exportation, 118.
Mokteree tribe, 121.
Mombas, Church Missionary Station at, 126.
—— Mission Map, 126.
"Monarch of the Mounts," 113.
Mongol peasant-girl, sketch of a, 212.
Mongolia, North-West, 350.
Mongols, character of, 216.
"Monkey-rope," 91.
Montes Lunæ of Ptolemy, 440.
Montgomerie, Major T. G., Account of a Havildar's Journey to Faizabad, 253 *et seq.*
Moola Doora, 139.
Morecambe Bay, survey of, 316.
Morgan, Mr. D., on Palladius' Journey through Manchuria, 204 *et seq.*
Mori, 201.
Mosyllon, emporium, 153.

Moudjart Pass, 350.
Mountain range, vague use of the term by Humboldt, 407.
Mountains of the Moon, 387.
Mueller, Dr., 224.
Mühry, Dr., 239.
Mukden, 206; city, 210.
Mund settlement, 140.
Mundus of the 'Periplus,' probably Zaila, 153.
Munzinger, Mr., 149.
Murchison, Sir R. I., Sir H. C. Rawlinson's remarks on the death of, 81; hypothesis of, on the physical structure of the African continent, 92; Mr. Galton's remarks on the extent of his geographical labours, 100; bequest of 1000*l.* for the advancement of geography, 132; testimony at Antwerp to his services in advancing geographical science, 134; obituary notice of, 293.
Muruts, the, 171, 173, 175.
Musters, Commander G. C., award of gold watch to, 284.
———, Mr. J. C., acknowledgment of award in behalf of his brother, 284.
'Mzinyani River, 91; mouth of, 93.

Naka, the, 108.
Napoleon the Great, 109.
Nassau, the, 321.
Nasik boys, Dr. Livingstone's, 381, 417, 425.
Natal coast, sand-bars at mouths of rivers of, 138.
Natural History collections, on making, by Mr. H. W. Bates, 67.
Náivasha, salt lake, 128.
Ndara, 170.
Ndunguni, 168.
Nea, island, reef-formation of, 394.
Nearchus, general of Alexander the Great, 139, 220.
Negri, Chev. Cristofero, 328.
Neibash, Lake, 439.
Neilgherry Hills, experiment with "bunds," or dams, in, 138.
Nemusha, sword, 121.
New, Rev. C., 127, 162, 167, 168, 170, 367, 375, 381, 383, 385, 387; ascent of Mount Kilima Njaro, 167 *et seq.*, 367.
New Chang, port of, 214.
—— Chib, Chinese characters, 215.
—— Guinea, 203, 204; Papuans of, 355.
—— Hebrides, volcanic formation of, 391; natives of, 392; Presbyterian Mission at, 391.
—— South Wales, coast survey of, 320.
'New York Herald,' 370, 441.
Neustra Senora de la Luz, island, 389.
Nguna, island, 392.
Niebuhr, M., 119.
Nikolsk, ruins near, 213.
Nimárah, 109.
Niriz, position of, 262.
Nisab tableland, 117.
Njémsi Volcano, 128.
Nonny River, 205, 212.
Nordenskiöld, M., 230, 239, 363.
North China and Japan, survey of, 321.
North-Polar Basin, on the exploration of the, by Capt. S. Osborn, 227 *et seq.*
Northern Borneo, 171 *et seq.*; vocabularies of languages of, 179 *et seq.*
Nova Zembla Sea, 234.
Nuanetzi River, 95, 99.
Nuksan Mountain, 256; Pass, 259.
Nusserabad settlement, 140.
Nyassa, Lake, 412.

Ocean basins, exploration of, 322.
Oceanic Currents, investigation of, by Dr. Carpenter, 323.
Odût creek, 137.
Ofuwi, Cape, 196.
Ogass, or chief of the Somâl, 152.
Okara, or Lake Victoria, 439.
Old Calabar and Cross Rivers, 135, 368.
Olibanum, or frankincense, 151, 154.
'Oman, Arabian Princes of, 126.
Ommanney, Vice-Adm., 84, 240; Report on the Antwerp International Congress, 132 *et seq.*
Orfuan, town, 117.
Osborn, Capt. S., on the Exploration of the North-Polar Basin, 227 *et seq.*; on the volcanic character of the Pacific, 394.
Otarunai River, 195.
Otter, Baron von, Polar exploration of, 86, 230.
Owdalee territory, 117.
Owlakee, Lower, 117; Upper, 117.
'Our Ocean Highways,' 326.
Oxus River, geography of the, 341.

Padass River, 172.
Padinah height, 262.
Paget, Capt., 204.
Palestine Exploration, 87, 331.
Palgrave, Mr. W. G., on Southern Arabia, 122; on the Perso-Khelat Frontier, 221; Account of a Tour in North-Eastern Anatolia, 223 *et seq.*; on the El Safâ region, 114, 334.
Paliakoff, M., 351.
Palladius, the Archimandrite, Journey through Manchuria, 204 *et seq.*
Palmer, Mr. E. H., "the Pundit," 332.
Palmyran inscriptions, 105.
Palor, upper part of Chitral Valley, 246.
Paluans, the, 172, 173.
Pangalat River, 172.
Papar River, 172.
Paper squeezes, on taking, by Rev. F. W. Holland, 66.

Parkes, Sir Harry, on the island of Yezo, 188; on Manchuria, 214, 216.
Parry, Sir E., 235.
Patteson, Bishop, 391, 394.
Pavy, Mr. Octave, American Polar Expedition of, 86.
Payer and Weyprecht, MM., Polar Expedition conducted by, 85; 230, 231, 360.
Pickering, Mr., 266.
Pei-po-hwans, shipwrecked, 267, 268.
Peking, Russian Ecclesiastical Mission in, 215.
Pemans, the, 176.
Pendulum Islands, 229.
Perry, Rev. S. J., 133.
Persepolis Valley, 261.
Persian Gulf and Mediterranean railway, proposed, 335.
——— Surveys, 338.
Perso-Kelat Frontier, Survey of, by Major B. Lovett, 219.
Peshin settlement, 140.
Petroleum spring, an ignited, 267.
Photography for Travellers and Tourists, by Dr. Pole, 47; by Rev. H. B. George, 51.
Pigmies, Land of the, 354.
Pima of the Chinese Pilgrims identical with Peïn, 242.
Plate, River, survey of, 321.
Platen, Count, 203.
Pliny, 112, 156.
Polar Expedition, Swedish, 363.
—— Sea, an open, a mere hypothesis, 230.
Polynia, 233.
Polhem steamer and *Gladan* brig, Swedish North-Polar exploring vessels, 363.
Pole, Dr., on Photography for Travellers and Tourists, 47.
Ponda tribe, detention of English survey party by, 318.
Porcupine, the, 315.
Portsmouth Harbour, survey of, 317.
Portuguese possessions on the East Coast of Africa, cause of decay of, 99.
Pottinger, Col., 219.
Poulinquet Island, 319.
Power, Mr. J., obituary notice, 314.
Pratt, Capt., on the adjustments of the "Everest Theodolite," 43.
Priestley, Col., 346.
Ptolemy, 112, 440.
Pundits, Major Montgomerie's, 86.
Purcell, Dr., 149, 166.
Putatan River, 172.
Pyxartes Valley, 223.

Qua Mountains, 136; River, 136.
Quaishos, or head-quarters, Yezo, 190, 358.
Quatrefages, M., 133.
Queensland, coast survey of, 320; cotton cultivation in, 391.

Raaba, village, 119.
Raateba, town, 120.
Rabat-el-Khalee desert, 116.
Radhee, Arab saint, tomb of, 120.
Raghayleh, the, 113.
Rajm el Shalshal, 110.
Rand, town, 118.
Ras Feeluk, 150.
Rashid El Bostaji, 114.
Rassam, Mr. Hormuzd, on the means of communicating with Dr. Livingstone, 125.
Rawlinson, Sir H. C., Address on opening the Session, 81-89; Remarks on Capt. Elton's paper on the Limpopo, 101; on Himyaric literature, 123; on the illness of the Prince of Wales and the position of Dr. Livingstone, 124; on the use of native explorers, 132; on the urgency of the Livingstone Search and Relief Expedition, 145-148; Letter requesting Government aid towards the expenses of the Expedition, 163; comments on the refusal, 165; on the prospects of the Expedition, 166, 186; on the snow-capped Mount Kilima Njaro, 171; on Sir S. Baker's Expedition, 187; on the progress of the Livingstone Expedition, 203; on Beloochistan, 218, 219, 224; on the mountains of Mekran, 221; on Arctic explorations, 235, 240; on the Livingstone Search and Relief Expedition, 241; on the Indian Caucasus, 261; on the award of the Royal and other Awards, 278-285; on the Public Schools Prize Medals, 287; Anniversary Address, 291-377; Narrative of proceedings of the Society in regard to Dr. Livingstone, 369 *et seq.*; on authentic intelligence as to the safety of Dr. Livingstone, 379; on the theory of coral formation, 394; on Central Asia, 409; on telegram from the Governor of Bombay relating to Dr. Livingstone, 410; Letter of Thanks to Mr. H. M. Stanley, 429.
Rebmann and Krapf, journeys of, 126, 168.
Redscar Bay, 204.
"Regio Patalis," possibly indicating Australia in old map of the world, 353.
Rejang River, 172.
Research, surveying ship, 390.
Resolution, Capt. Cook's vessel, 389.
Rezaaz tribe, 118.
Ribe, 170.
Richards, Adm. G. H., on Polar exploration, 237.
———, Staff Commander J., 316, 322.
Richmond River, 320.
Rigby, Maj.-Gen., on East African geography, 130; on the Somali country, 155; translation of Seyd Burghash's letter, 384.
Ri'mat el Lohf, 105.
Rio de San Pedro, 150.
Ripplemonde, birthplace of Mercator, 135.
Riza, harbour of, 223.

Robb, Dr., ethnology of West African coast, 369.
Rochelle, Mr. I. H., on Geographical Positions in the Amazon Valley, 271-274 *et seq.*, 359.
Roper River, ascent of the, 355.
Rosario, the, 388, 391.
Rosenthal, Mr., Greenland Expedition of, 86.
Ross, Major E. C., Journey through Mekran, 139-141 *et seq.*; Report of a Journey through Mekran, 219.
Rossenrode, Mr. W. C., 343.
Routes, projection of, by Staff-Commander C. George, 53.
Rover, massacre of crew of, 265.
Rovuma River, 158.
Rua, underground village, 380, 387, 410, 411.
Ruhbah Valley, 107.
Rukwa, probably Rua, 411.
Russia, Polar explorations by, 86; expeditions of, political as well as geographical, 213; approach of, to frontiers of India, 261.

Saadi, tomb of, 261.
Sádi bin Ahédi, 127.
Saeed bin Majid, 375, 385, 386.
—— bin Salim, 386.
Saghalien, Island of, 215.
Said, Port, survey of, 317.
Saidabad, town, 263.
Salâr, or Salarun, 245.
Salás Ikhwán, or "Three Brothers," 114.
Salmon fishery of Yezo, 198.
Salsporo Ainos, 200.
Salt water, density of, 239.
Sambulan River, 172.
Sami, 140.
Samoan Mission, 391.
Sampa, or fishing-boat, 198.
Sand Bars at Mouths of South African Rivers, Dr. R. J. Mann on, 138, 139 *et seq.*
Sandal-wood trade with China, 391.
Sanglech, 257.
Sanju, 245.
Santa Cruz group, reef and volcanic formation of, 391; natives of, 392.
Saunders, Mr. T., 166; on Capt. Speke's mistake as to the Victoria Nyanza, 131; on Mekran, 221; on the Kuen-luen, 408.
Saut, or "Whip-thong," clay district, 110.
Scandinavia, flora of, 236.
Schépeleff, M., 350.
Schmidthals, Baron von, 285.
Schools Prize Medals: Statement of Results of Examination, by Mr. F. Galton, 286; Address of the President on, 287; Presentation of Medals to successful Competitors, 288; Address of Hon. G. C. Brodrick on, 289.
Schweinfurth, Dr., 366 *note*.
Scientific Geography, on the Scope of, by Gen. R. Strachey, 443 *et seq.*
Scott, Mr. R. H., 239.
Sea-weed fishery in Yezo, 190.
Seemann, Dr. Berthold, 391; obituary notice, 310.
Seistan, Lake of, 218.
Severtsof, Russian geologist, 409 *note*.
Sextant glasses, to silver, 17.
——— Observations, 12.
———, Notes on, by Mr. Galton, 16.
Seyd Burghash, 381, 383, 384.
Seymour, Mr. Danby, 387, 411.
Shaafel, Sultan, 119.
Shafaiy, sect of, 121.
Shahidulla Gorge, 401.
Shakeree tribe, 120.
Shakkah, the ancient Saccæa, 107.
Shasha River, 90.
Shaw, Mr. R. B., award of Medal to, 281; on the Position of Pein, Charchand, Lob Nur, and other places in Central Asia, 242 *et seq.*; Central Asia in 1872, 395 *et seq.*
Shaykh Hasan 'Brahim, house of, 107.
——— Yusuf Sharaf, 107.
Shearwater, the, 317.
Shereef, 434, 437, 438.
Shingshal, 246.
Shiraz to Bam, Route from, by Major B. Lovett, 261 *et seq.*
Shi-san-shan Hills, 209.
Shoogra, seaport, 117.
Si'a, ruins of, 105.
Silvia, H.M.S., 188.
Sir-i-Dasht lead-mines, 263.
Sirjan Valley, 263.
Siŭi-ming-tsin, legend of, 209.
Skinner, Capt., 399.
Smith, Mr., high north latitude attained by, 361.
——— Sound, 230, 238, 240.
Snow on Kilima Njaro, 169.
Softah-Mehemet, brigand chief, 224.
Sokpo, nomad tribes, 402.
Solomon Islands, 394; discovery of, 388.
Somâl, obscurity of the name, 152; meaning of, 156.
Somali Country, Capt. S. B. Miles on the, 149 *et seq.*; race, 155, 156.
Somerset, Duke of, 228, 231.
Soya, 194.
Speke, Capt., 127, 380, 411.
Spitzbergen, Swedish expeditions to, 230.
Spratt, Capt., 84.
St. Abbs, survivors of the wreck of, 230.
St. John, Major, 344.
Stanley, Lieut. H. I., 320.
———, Mr. H. M., 88, 103, 159, 160, 226, 370, 371, 373, 375, 376, 380, 381, 385, 387, 410, 411, 412, 415, 417, 419, 420, 421, 425, 429, 434, 435, 436, 437, 438, 440, 441.
———, Staff-Commander G., 318.
Steinhuyse, M. d'Hane, 133.

Stewart, Capt., 332.
Stor Fiord, 231.
Strabo, 111.
Strachey, Gen. R., on the Scope of Scientific Geography, 443 *et seq.*; on Central Asia, 407.
Struve, M., 351.
Subbeihah country, 120; tribes, 120.
Subischani River, mouth of the, 94.
Suez, Gulf of, survey, 317.
Sulphur, the, 390.
Sultani track, 110.
Sumugh, or gum-arabic, 151.
Sungari River, 351.
Superstitions, curious, of the Chinese in Manchuria, 211.
Sureeÿa, Fudhlee capital, 117.
Surprise schooner, 203.
Surville, Capt., 389.
Swallow, Chinese respect for the, 211.
——— group, reef-formation of, 391; natives of, 392.
Swallow sloop, Capt. Cartaret's, 389.
Swedish Polar Expedition, 86.
Swinhoe, Consul, 357.
Switzerland, geographical researches by, 327.
'Sydney Herald,' 203.
Sylvia, the, 321.

Tabuhan country, 172.
Taghâlma Peak, 401.
Taghdumbash, 246.
Tai-tsu, founder of the Kitan empire, 210.
Taiwan-foo, city of, 271.
Takasima, 196; Head, 196.
Takla-Makân, 404.
Takow, position of, 271.
Talar Pass, 139.
Tamzerah, mines of, 223.
Tanganyika Lake, uncertain extent of, 130; 380, 411, 435.
Tanna, island, 389, 391; extraordinary hair-dressing of the islanders, 392.
'Tarikh Rashidi,' the, 246.
Taromai Volcano, 201.
Tati River, 89.
Taumaco, island, 389.
Taveta, 168, 170; people of, 170.
Taymá, village, 107.
Tcholok River, 224.
Tchubinsky, M., 351.
Tecopia, island, 389, 390.
Teheran, longitude of, ascertained by telegraph, 344.
Teitas, the, 170.
Tell 'Akir, "Head-man of the Hillocks," 112.
—— Akriba, 106.
—— Ijánah, 106.
—— Jafneh, 106.
—— Rubáh, 106.
—— Shayhan tumulus, 105.
Testu, Guillaume le, 353, 354.
Thenet, André, 354.
Theodolite, Transit, employment of, 37; the "Everest," adjustments of, described by Capt. Pratt, 43; on observations with the, by Col. J. T. Walker, 32.
Thermometer, Boiling-point, use of, 26.
Theÿre, town, 117.
Thiri, or Uthiri, district, 129.
Thornton, Mr., 127.
Thuillier, Col., 345.
Tibetan mode of recording past events, 403.
Tinahula volcano, 391.
Tobbaan River, 119; Wadee, 119.
Todd, Mr., 355.
Tofiki, 169.
Tok-e-Tok, Chief, Visit to, by Mr. T. F. Hughes, 265 *et seq.*
Tokos Dewân, the "Nine Mountain Passes," 244.
Tolo Azime, cataracts of, 91.
Tomal, blacksmith tribe, 152.
Toomp settlement, 140.
Trachon, Eastern, of the Classics, 111; Western, of the Greeks and Romans, 105.
Trachonitis, scanty geographical knowledge of, 105; basaltic formation of, 108; error as to, in popular geographies, 112.
Traveller, outfit for the, 7-11; Dr. Kirk on, 12.
Travellers, Hints to, 1-78.
Treasury, the, refusal of grant in aid of the Livingstone Search and Relief Expedition, 164.
Trebizond, Port of, 223.
Triangulation, rough, without instruments, by Mr. F. Galton, 63.
Tromsö, 231.
Tsetse-fly, danger of bite of, exaggerated, 96.
Tsi-huan-ling and Huan-hi-ling, "Hill of Sorrow" and of "Joy," 209.
Tsin-Chi-Hwang-ti, stone statue execrating his memory, 209
Tsippa, boat, 199.
Tsi-tsi-khar, city, 205, 206, 211.
Tucker, Mr. J. C., 204.
Tui-La-Sok River, 265, 266.
Tuli River, 90.
Tulúl el Safá, exploration of, 104 *et seq.*
Tung Chal range, 263.
Tungânis, the, 405.
Tunguz, 207.
Turfân province, goats' wool of, 406; city of, 404.
"Turning-point Mountain," 106.

Uganda, King of, 166.
Ujiji, 413.
Ukara, or Ukerewe Lake of Equatorial Africa, Capt. Burton on, 129 *et seq.*
Umbari, one of Speke's "faithfuls," 419.
Umm el Ma'azah, "Mother of the She-goat," 112.

Umm el Zaytun, 105.
—— Hauran Hill, 106.
—— Izn, "Mother of an Ear," 113.
—— Niran cave, 111.
Umseila, chief, 99; his tribe, 95.
Uncomogazi, or King George's River, 96, 98.
United Presbyterian Church Mission, 137.
Unyanyembe, 414.
Upas poison, how made, 174.
Upper Indus gold-fields, 401.
—— Nile Expedition of Sir S. Baker, 162, 187, 365, 418.
—— Yellowstone River, 330.
Urumchi, city, 404.
Usambara, highland of, 126.
Ussuri River, lost by the Chinese, 214.
Usui no yama Volcano, 201.

Vaez, Don Luis, 389.
Vanikoro, island, 390, 393, 394.
Vanua Levu, island, 393.
Vasco de Gama, pillar to, at Melinde, 126.
Vaughan, Dr., on exploration in Southern Arabia, 123, 156.
Veer, Gerrit de, 362.
Veniukoff, M., 205, 350.
Verzino, Brazil so called, 354.
Victoria, Australia, coast survey of, 320.
—— Bay, 216.
—— Nyanza, the, 367; a lake region, 129.
Volcano Bay, 193, 201.
Vu-tai-shan, saints' shrine at, 209.

Wa'ar, stony ground, 109, 110.
Wady Jahjáh, 108.
—— el Krá'a, 110.
Wahidee States, 116.
Wakefield, Rev. T., 127; Map of Eastern Africa, by, Notes of Mr. Keith Johnston, on, 125 *et seq.*
Wales, H.R.H. the Prince of, illness of, 124.
Walker, Capt. J. B., on the Old Calabar and Cross Rivers, 135 *et seq.*; 368.
——, Col. J. T., 260, 344; on observations with theodolites or altazimuth instruments, 32.
——, Dr., 86.
Waller, Rev. Horace, 411; on the urgency of the Livingstone Search and Relief Expedition, 149; on the position of Dr. Livingstone, 242.
Wa-Masai tribe, 129.
Warren, Capt., 332.
Warudi, wild tribe, 129.
Washaki tribe, 129.
Wataturu tribe, 129.
Watch, description of, most useful to the traveller, 23; on keeping watertight, 24.
Wellsted, Lieut., 119, 121, 123, 154.
Western Yunan, Expedition to, 347.
Westland, Mr., 347.
Wetzstein, Dr., 105, 108, 109.
Weyprecht, Lieut., 231.
Wilberforce, Mr., 136.
Williamson, Rev. Mr., 214.
Wilson, Capt., 390.
Wiseman, Commodore, 391.
Wodehouse, Sir Philip, 380.
Won-won ape (Hylobates), 177.
Wood, Capt. J., obituary notice, 300.
Wood, semi-fossilized, of the Arctic regions, 238.
Wrède, Baron von, explorations by, 115, 122.

Yaafaiy Mountains, 118; tribes, 118.
Yárkand River, 246.
Yasowa Volcano, 392.
Yassin, elevation of, 260.
Yeraanus, Wadee, 118.
Yezo, the island of, Capt. Blakiston on, 188 *et seq.*
Yoshitsune, 189.
Young, Mr. E. D., expedition of, 413.
Yubuto, 201.
Yule, Col., 83, 243; award of Founder's Medal to, 278.
Yung-ping-fu, 205.

Zaidiyyah sect, 121, 122.
Zakariyya-bin-Muhammad el-Kazwêny, the Muslim naturalist, 156.
Zamaris, Jewish general, 114.
Zanzibar, hurricane at, 382.
Zats, 221.
Zebak, 256.
Ziegler, M. J. M., 327.
Zilm, or Zulm, 245.
Zirs, the, 113.
Zora, or Dar'ah, 105.
Zoutspansberg, spurs of the, 94.
Zulu tribes, practice of cutting down all trees near their villages, 95.

END OF VOL. XVI.

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2.3