THE

JOURNAL

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

VOLUME THE THIRTY-FOURTH.

1864.

EDITED BY THE ASSISTANT-SECRETARY.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.

1867. Feb. 13

Bowditch.

Preservation has seen
missing map. after p. 56
1/97

LONDON: PRINTED BY W. CLOWES AND SONS, STAMFORD STREET,
AND CHARING CROSS.

CONTENTS OF VOL. XXXIV.

PAGE

Council Report, Balance-Sheet for 1863, and Estimate for 1864 .. v—xix
„ Prize for Reflecting Instruments xx
„ Letters relating to Maps and Charts.. .. .. xxi—xxiv
„ New Foreign Honorary Corresponding Members .. xxv
Library Regulations xxvii
List of Council, Officers, and Fellows .. .. xxviii—lxxxiv
List of Public Institutions, &c., to which the Publications are presented lxxxv
Individuals to whom the Royal Premium has been awarded lxxxvi—lxxxix
Accessions to Library and Map-rooms, with Names of Donors .. .. xc—civ
Instruments lent out. Presentation of Gold Medals .. .. .. cv—cviii
Anniversary Address, by Sir R. I. Murchison .. .. cxix—cxciii

[N.B. The Authors are alone responsible for the contents of their respective papers.]

ARTICLES. PAGE

1.—Geographical Notes of an Expedition to Mount Kilima-ndjaro in 1862-63. By the Baron Charles von der Decken, Honorary Corresponding Member R.G.S. 1

2.—Notes on the Island of Formosa. By Robert Swinhoe, F.R.G.S., H.B.M. Vice-Consul at Formosa 6

3.—On the Glaciers of the Mustakh Range. By Captain H. H. Godwin-Austen, F.R.G.S., Bengal S.C., late H.M. 24th Regt., Assistant in the Great Trigonometrical Survey of India 19

4.—Reconnaissance Survey of the Lake Districts of Otago and Southland, New Zealand. By James M'Kerrow, Esq. District Surveyor to the Province of Otago 56

5.—An Exploration up the Moisie River, to the Edge of the Table-land of the Labrador Peninsula. By Henry Youle Hind, M.A., F.R.G.S., Trinity College, Toronto 82

6.—Notes on the Mountains and Glaciers of the Canterbury Province, New Zealand. By Dr. Julius Haast, M.D., F.G.S. 87

7.—Expedition to the West Coast of Otago, New Zealand; with an Account of the Discovery of a Low Pass from Martin's Bay to Lake Wakatipu. By James Hector, Esq., M.D., Provincial Geologist 96

8.—Observations made in Central, Eastern, and Southern Arabia during a Journey through that Country in 1862 and 1863. By W. G. Palgrave, Esq. 111

9.—Notes on the Physical Geography of Vancouver Island. By C. Forbes, Esq., M.D. 154

10.—Remarks upon the Geography and Natural Capabilities of British Columbia, and the Condition of its principal Gold-Fields. By Lieutenant H. S. Palmer, R.E. 171

ARTICLES. PAGE

11.—Notes on the Zambesi and the Shiré. By the late Mr. RICHARD THORNTON. (Addressed to SIR R. I. MURCHISON, Pres. R.G.S.) .. 196

12.—On a few Fossil Bones from the Alluvial Strata of the Zambesi Delta. By JOHN KIRK, Esq., M.D., F.R.G.S... 199

13.—On the Antiquity of the Physical Geography of Inner Africa. By SIR RODERICK I. MURCHISON, K.C.B., Pres. R.G.S. 201

14.—Expedition across the Southern Andes of Chili, with the object of opening a new Line of Communication from the Pacific to the Atlantic Ocean, by the Lake of Nahuel-Huapi and the Rivers Limay and Negro. By DON GUILLERMO COX, of Chili. (Translated from the Spanish and communicated by SIR WOODBINE PARISH, K.C.H., F.R.S.) 205

15.—Details of a Journey through part of the Salado Valley, and across some of the Argentine Provinces. By THOMAS J. HUTCHINSON, F.R.G.S. 226

16.—Explorations to the West of Lake Nyassa in 1863. By DR. LIVINGSTONE, M.D., LL.D., F.R.G.S. (Addressed to SIR R. I. MURCHISON, Pres. R.G.S.) 245

17.—Visit to Lingah, Kishm, and Bunder Abbas. By LIEUT.-COL. LEWIS PELLY, Acting Political Resident, Persian Gulf. (Communicated by the Secretary to the Government of Bombay) 251

18.—On the Comoro Islands. By CAPTAIN ALGERNON DE HORSEY, R.N. 258

19.—Some Account of the Physical Geography of Newfoundland. By JULIAN MORETON, Colonial Chaplain, Labuan 263

Hints to Travellers. By ADMIRAL SIR G. BACK, F.R.S., ADMIRAL COLLINSON, C.B., and FRANCIS GALTON, Esq., F.R.S. 272

INDEX 317

ILLUSTRATIONS.

			PAGE
1.	VON DER DECKEN	Kilima-ndjaro	1
2.	SWINHOE	Formosa	6
3.	GODWIN-AUSTEN	Mustakh Range	19
4.	M'KERROW, HAAST, and HECTOR	Canterbury and Otago, New Zealand	56
5.	HIND	Moisie River	82
6.	PALGRAVE	Arabia	111
7.	FORBES	Vancouver Island	154
8.	PALMER	Cariboo and British Columbia	171
9.	COX	Southern Chili	205
10.	HUTCHINSON	Salado Valley	226
11.	PELLY	Kishm	251
12.	MORETON	Newfoundland	263

Royal Geographical Society,

1864.

REPORT OF THE COUNCIL,

Read at the Anniversary Meeting on the 23rd May.

The Council lay before the Royal Geographical Society a general statement of its affairs classed under the heads of "Number of Members," "Finances," "Arrears," "Past and Present State of the Finances," "Publications," "Royal Premium or Donation," "Objects proposed in inaugurating the Society," "Revision of the Regulations," "Treasurer," "Library," "Accessions to Library," "Accessions to Map-room," "Means used to enlarge the Map-room Collection," "Instruments," "Grants to Travellers."

The Council have the pleasure to report that the administration of the Society's affairs continues to be efficiently carried out under the five permanent working Committees of Council, originally indicated in the Report of 1853, and into which the Council is divided, as provided for in Section 8 of Chapter VI. of the lately revised Regulations, viz. :—

1. Regulations and Bye-laws.
2. Finance and House.
3. Library, Maps, &c.
4. Publications.
5. Expeditions.

And the regulations requiring the Vice-Presidents, twice or oftener in every season, to examine in detail the state of the household, the Assistant Secretary's department, and the amount of care displayed in keeping the official books, and the library, including the maps, drawings, and instruments, are carried out.

Number of Members.—The Council have to report that since the last Anniversary Meeting there have been elected 233 * new

* Ordinary	184
Compounding	31
Honorary	18
	233

Members; and that within the same period there have occurred 61 vacancies, of which 32 are by death and 29 by resignation, and of these 9 are Life-Compounders. The Council have also had the satisfaction of recently enrolling amongst the Fellows of the Royal Geographical Society a number of distinguished foreigners, whose names and claims, as set forth in the list in Appendix F., will show that their election is justly merited.

The Society, according to the List of Fellows corrected up to April, 1864, consists at present of 1907 Members, of whom 498 are Life-Compounders, and 1409 are nominally Life-Subscribers, besides 4 Honorary and 65 Honorary Corresponding Members.

The number of Members who, according to the list corrected up to 1st January, 1863, compounded for their annual subscriptions was 461, and 1409 were Annual Subscribers—total, 1750 Members; so that, after deducting the casualties, there are 37 additional Life-compositions and 120 annual paying Members, making a total increase of 157 Members, Annual, and Life-Subscribers.

Finances.—The Council have again the satisfaction of making a favourable report of the Society's funds, although the expenses of the year have been considerable, from the charge of the donation to Dr. Shaw appearing in this year's accounts, as sanctioned at the last Anniversary Meeting.

The accompanying Balance-sheet (*vide* App. A.) for the year ending 31st December, 1863, and bearing the signatures of three of the four Auditors, in proof of the accounts being regularly and duly vouched for, shows that the estimated receipts and expenditure laid before last year's Meeting have differed from the actuals, but in a way favourable to the Society; the receipts estimated having been stated at 4,502*l.* 10*s.*, exclusive of the cash in hand; whereas the actuals amounted to 5,256*l.* 9*s.* 3*d.*, exclusive of the cash balance. The estimated expenditure also was put down at 5,747*l.* 5*s.* 2*d.*, or at 3,897*l.* 5*s.* 7*d.*, excluding the money proposed to be invested; but the outlay, exclusive of the cash and amount invested, was only 3,655*l.* 4*s.* 1*d.* The difference between the actual receipts and actual outlay has left a surplus balance in hand of 1,601*l.* 5*s.* 2*d.*; and by a diminution of the cash-balance kept in hand, from 1,244*l.* 15*s.* 2½*d.*, at which it stood on 31st December, 1862, to 1,008*l.* 10*s.* 4½*d.* on 31st December, 1863, the Council have had available for investment in the Funds a sum of 1,837*l.*, for which there has been purchased 2,000*l.* amount of Stock in Three per Cents.

The differences between the estimated and actual receipts are occasioned by the collections for annual subscriptions, life compositions, recoveries of arrears and entrance fees, having exceeded the estimate made at the beginning of the year. The expenditure, on the other hand, as regards the cost of the Journal, and salaries and office expenses, has fallen below the estimate; whilst the portion of the expenditure in excess of the amount in the estimate in respect to the items of gratuities, rent, and taxes, is but trifling, the excess thereon having amounted to 80*l.*

No private money donations have been received this year.

The current accounts standing against the Society at the close of the year are all in course of liquidation, and every endeavour is to be made to pay all charges as they are incurred, or within the year; measures having been taken to ensure in future, as far as practicable, an immediate or at least a very early settlement of all liabilities, as well as to enforce a more speedy payment of sums due to the Society. And, in accordance with the suggestions of the Auditors, a monthly concurrent audit of the charges, receipts and transactions will be fully effected before the close of the year.

The Estimate (*vide* APP. B.) for the present year, ending 31st December, has been carefully prepared; and, as no unusual expenses are anticipated, the Council hope to find the results of the year as favourable to the Society as for the past year, and the funds thus becoming available may be applied for more extensively carrying out the objects and general operations for which the Society was formed.

Arrears.—The arrears of subscription owing to the Society on the 1st January last, amounted to about the sum of 600*l.* due from various members, of which it has been found impossible to recover, up to the present date, more than 174*l.* Of the remainder the Council expect to recover about 250*l.*, but regret to have to report that from various circumstances the recovery of the balance, amounting to about 150*l.*, is very uncertain, and it will probably be lost. In order, however, as far as possible to limit any future increase to the number of defaulters, the Council have determined to enforce the rule first proposed in the Council's Report at the Anniversary Meeting of the year 1849, and now entered in the Statutes under Chapter IX., Paragraph 3; and by means of arrangements to be made for carefully examining in future the monthly progress of the payments, it is hoped that the great difference hitherto observable between the number of Fellows on the rolls of the Society, and the number of paying Members, will gradually diminish.

Past and Present State of the Finances.—The financial position of the Society has greatly improved during the last fifteen years, as the following tabulated statements will indicate.

At the first Meeting of the Society, on the 16th July, 1830, it was resolved, "That such part of the Funds of the Society as may not be required for current expenses be placed in the Public Securities and vested in the names of three Trustees." And in the Report laid before the Meeting of 1832 it was stated that the Council had resolved, "That the Compositions be set apart as a Capital Stock, to be lodged in Government or other unexceptionable Securities, and kept at least equal to the amount of the compositions of all compounding members alive at any given time; whilst the annual subscriptions, with the interest on this Stock, and other items of accruing income, will be disposable to meet the current expenses of the year."

The Funded Capital of the Society, consisting at the beginning of 1863 of 7,500*l.*, and at the close of the year 1863 of 9,500*l.* New 3 Per Cent. Government Stocks, was increased during the past year by the purchase of 2,000*l.* Stock for a cash payment of 1,837*l.* 10*s.*, and since the 1st January of this current year an addition has been made by funding a sum of 896*l.* 5*s.*, for which 1,000*l.* New 3 Per Cent. Stock has been purchased, making a total of 10,500*l.* Stock, yielding an annual income of 315*l.*, as the reserve Fund of the Society up to this date.

The amount invested in the Consols is equivalent at par to the compositions of only 420 Compounding Members, calculating for each at the existing rate of 25*l.*, which is 8*l.* in excess of the former sum of 17*l.*, at which the composition of several was originally made. And as the numbers of all the living Life Members at present are 498, the Funded Property may still be considered by some Fellows to be less in amount than the

Rules of the Society require; and, in order that the finances should be placed on a solid basis, the total of the Funded Property may be considered as insufficient until it reaches the sum of 12,450*l.*, instead of only 10,500*l.*, as at present, supposing the commutation payments at the rate of 25*l.* for each member were invested. But from inquiry, it is understood that other Societies are prepared to commute the annual subscriptions of all members for a sum equivalent to ten years' subscriptions; and as two pounds is the annual amount paid by each Fellow, the Stock now invested, viz., 10,500*l.*, is fully equal to the Funded Property necessary to cover the commutation payments.

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to the 31st Dec. 1863.

Year.	Cash Receipts within the Year. £. s. d.	Cash Amounts invested in Funds.	Deducting Amounts invested in Funds; actual Expenditure. £. s. d.
1848	696 10 5	.. ..	755 6 1
1849	778 3 0	.. ..	1098 7 6
1850	1036 10 5	.. ..	877 2 10
1851	1056 11 8	.. ..	906 14 7
1852	1220 3 4	.. ..	995 13 1
1853	1917 2 6	.. ..	1675 6 0
1854	2565 7 8	.. ..	2197 19 8
1855	2584 7 0	.. ..	2636 3 1
1856	3372 5 1	533 10 0	2814 8 1
1857	3142 13 4	378 0 0	3480 19 9
1858	3089 15 1	.. ..	2944 13 6
1859	3471 11 8	950 0 0	3423 3 9
1860	6449 12 1	466 17 6	5406 3 7
1861	4792 12 9	1358 2 6	3074 7 4
1862	4659 7 9	1889 7 6	3095 19 4
1863	5256 9 3	1837 10 0	3655 4 0

In 1856 a Treasury Grant of 1000*l.* for the East African Expedition received.

In 1860 a Treasury Grant of 2500*l.* for the East African Expedition received.

STATEMENT showing the Progress of the INVESTMENTS of the Society from the Year 1832 to the 31st Dec. 1863.

End of the Year, Dec. 31.	Cash invested. £. s. d.	Amount of Stock purchased. £. s. d.
1832	3657 10 0	4000 0 0
1833	4130 0 0	4500 0 0
1834	4426 0 0	4800 0 0
1835	4426 0 0	4800 0 0
1836	4426 0 0	4800 0 0
1837	4426 0 0	4800 0 0
1838	4426 0 0	4800 0 0
1839	4129 15 0	4500 0 0
1840	3788 10 0	4150 0 0
1841	2801 0 0	3150 0 0
1842	2801 0 0	3150 0 0
1843	2219 18 6	2578 4 4
1844	2219 18 6	2578 4 4
1845	2219 18 6	2578 4 4
1846	1933 1 0	2278 4 4
1847	2133 1 0	2502 6 2
1848	1886 16 8	2224 1 10
1849	1886 16 8	2224 1 10
1850	1886 16 8	2224 1 10
1851	1886 16 8	2224 1 10
1852	1886 16 8	2224 1 10
1853	1662 14 10	2000 0 0
1854	1662 14 10	2000 0 0
1855	1662 14 10	2000 0 0
1856	2216 4 10	2600 0 0
1857	2594 4 10	3000 0 0
1858	2594 4 10	3000 0 0
1859	3544 4 10	4000 0 0
1860	4011 2 4	4500 0 0
1861	5369 4 10	6000 0 0
1862	6758 12 4	7500 0 0
1863	8596 2 4	9500 0 0

Publications.—The 32nd Volume of the Journal of the Society, which was announced as ready at the last Anniversary, has been brought out during the past season; and the Council are sanguine that the valuable papers it contains will greatly add to the usefulness of the Royal Geographical Society. The 33rd Volume of the Journal is now in the press, and would have been published before this, but for the death of the Assistant Secretary. The 7th Volume of Proceedings, containing five numbers, of which three have been published since last Anniversary, has also been completed, and Nos. 1, 2, and 3 of Volume VIII. printed; these will be found to contain *in extenso* several interesting Papers, though less important than those in the Journal.

The Council have also the satisfaction to announce, that Colonel Yule, C.B., has undertaken to prepare an Index to the Journals from Volumes XX. to XXX., and from the years 1851 to 1860 inclusive; and as the first two Indexes to the Journals (from Volumes I. to X.—from the year 1831 to 1840—and from Volumes XI. to XX.—from the year 1841 to 1850) were prepared and delivered to the Members of the Society—the first Index at cost price, and the second free of charge (as set forth in the Council Reports of 1843 and 1853)—the Council now propose that a copy of the new, or third Index, when completed, should, on the precedent of the last Index, be delivered to the Members free of charge, thereby facilitating a reference to the important subjects contained in the Volumes of the Society.

The public institutions, societies, and individuals supplied with copies of the Journals, Proceedings, and publications, are 126 in number, as set forth below,* a detailed list being also annexed (*vide* p. lxxxv.); and, as it is important that an exchange of publications should be effected, the Council propose to institute inquiries, as to how far the object is attained by the existing presentations, and whether further exchanges could be made.

The Council regret to report that the sale of the Journal and of the Society's Proceedings is very inconsiderable, and the unsold

* Great Britain and Ireland	45
Europe	48
Asia	7
Africa	2
America	17
Australasia	7
	126

stock large; but their disposal is still under consideration, as well as the measures necessary to make the publications more generally available for purchase.

Royal Premium.—At a Meeting of the Council of the Society on the 4th November, 1830, the announcement was made through Sir Robert Peel, one of His Majesty's Principal Secretaries of State, that His Majesty had been pleased to direct that an annual payment of fifty guineas should be made from the Privy Purse to the Society, to constitute a yearly Royal Premium for the encouragement of Geographical Science and Discovery. In the Report for 1836 the Council announced that His Majesty had been pleased to approve of converting a portion of the Royal Donation into a Medal, and of one particular device for it; and in the 1839 Report it was announced that the annual donation continued to the Society by Her Majesty should be converted into two Gold Medals of exactly equal value, to be designated the Founder's Medal and the Patron's Medal respectively.

Royal Premium Awarded.—The Patron's, or Victoria Gold Medal, has been awarded to Captain Grant, of the Indian Military Forces, for his journey from Zanzibar across Eastern Equatorial Africa to Egypt, in company with Captain Speke, and for his contributions to the work of that explorer. The Founder's Gold Medal for the encouragement of Geographical Science has been awarded to Baron C. Von der Decken, for his two Geographical Surveys of the lofty Mountains of Kilima-ndjaro, which he determined to be capped with snow, and to have an altitude of not less than 20,000 feet.

The sum of 25 guineas for the purchase of a Chronometer or other Testimonial, has also been awarded to the Rev. Gifford Palgrave for his adventurous journey in and across Arabia.

Objects proposed in inaugurating the Society.—The original Prospectus, dated 24th May, 1830, inaugurating the Society, provided for the aggregation of the vast store of Geographical information existing in Great Britain, but then so scattered and dispersed as to be nearly unavailable to the public; and declared, amongst other objects, that the Society would collect, register, digest, and print for the use of the members and the public at large, in a cheap form and at certain intervals, such new, interesting, and useful facts and discoveries as the Society may have in its possession, and may from time to time acquire. The other objects were to accumulate gradually a Library of the best Books on Geography, a selection of the best Voyages and Travels, and a complete collection of Maps and Charts, as well as such documents and materials as may convey the best information to persons intending to visit foreign countries. Also, to procure specimens of such instruments as experience has shown to be most useful, and best adapted to the compendious stock of a traveller; to prepare brief instructions for such as are setting out on their travels; to render pecuniary assistance to such travellers as may require it; to correspond with similar Societies abroad, and open communication with all the Philosophical and Literary Societies with which Geography is connected.

The terms on which the grant of the first of the Royal Premiums would be conferred, were settled by resolutions passed at a Council Meeting held on 15th January, 1831; but as the conditions on which the rewards for the two first years were to be awarded, and on which they would be given in subsequent years, have never yet been fully complied with, the Council avail themselves of this Annual Report to bring under notice the originally published requirements, as still fully applicable:—

"To the author of the best memoir, accompanied by sufficient plans and views, which shall describe in detail any important and unpublished discovery made by the candidate in any branch of Geography, provided that the same be considered worthy of this distinction."

The Council consider as coming within the meaning of this proposition,—

"A detailed account of any excavation or research made by the candidate, the result of which is the establishment of any lost site of antiquity, and the recovery of any object sufficiently important to History, Science, or the Arts."

Also, that His Majesty's Premium will be given "to the author of the best work transmitted to the Society of the following nature:"—

"A Travellers' Manual, containing a clear and concise enunciation of the objects to which a Geographer's attention should be especially directed; a statement of the readiest means by which the desired information in each branch may be obtained; a list of the best instruments for determining positions, measuring elevations and distances, observing magnetic phenomena, ascertaining temperature, climate, &c.; directions for adjusting the instrument, formulæ for registering the observations, and rules for working out the results; adapted to the use not of the general traveller alone, but also of him who in exploring barbarous countries may be obliged to carry, and often conceal, his implements."

Further, at future periods, to propose the following as prize subjects:—

"An essay on the actual state of Geography in its various departments, distinguishing the known from the unknown, and showing what has been and what remains to be done in order to render it an exact science; together with an indication of the best processes to be adopted in order to supply the several desiderata."

"An extensive series of Geographical Tables (with reference to authorities), showing the various names, written in the native language and character, by which the same places have been known in different countries and at successive periods of history."

"The best mechanical inventions for facilitating the acquisition of geographical knowledge, for rendering it more available to the public.

"Under this head may be included the simplification of instruments, more compendious methods of determining positions, and all improvements in the art of drawing and engraving maps, whereby their precision and distinctness may be increased, and greater scope and expression given to what may be called the language of topography."

The Council propose during this year to notify that premiums and other testimonials will be offered as encouragements for the best works on any of the subjects above set forth. It is now trusted that the improved state of the funds will shortly enable the Society to carry out in a more extensive form than hitherto, the original objects of the able founders of the Geographical Society.

Revision of the Regulations.—The Regulations, with the Charter of the Society, were presented to the Fellows of the Society in the year 1860; but as the supply of copies has been exhausted, and a few changes in the Rules have been made, the Council directed that the various alterations in the former edition of the Regulations, as set forth and sanctioned at the Anniversary Meetings, should be embodied, and a new set of the Regulations printed, copies of which are now laid before the Meeting.

Treasurer.—The Council regret to report the death on the 28th

February, 1864, of Mr. Robert Biddulph, the second Treasurer since the establishment of the Society, and the son of the first Treasurer; having been appointed on his father resigning the office on account of declining health. On that occasion the Council appointed (as stated in the 1845 Report) the Treasurer, trusting to the same being approved, and on that precedent they have appointed as Treasurer Mr. Reginald T. Cocks, one of the partners of the late Mr. Biddulph, and this appointment they hope will be approved. On the occasion of appointing a new Treasurer it may be advisable to point out that his responsibilities and duties are important and extensive. The Treasurer is one of the three Trustees in whose names are vested the funds of the Society, with special charge of all accounts, and the duty of collecting all sums due to the Society; appointing a Collector for whom he is responsible, the money collected being immediately paid over to the Bankers of the Society. The Treasurer keeps, in concert with the Secretaries, a complete list of all the Fellows of the Society, with the name and address of each accurately set forth; such List, with the other books of Account, being laid on the table at every ordinary Meeting of the Council. The Treasurer pays all accounts due by the Society, as soon as they have been examined and approved by the Council, and his accounts are annually audited by two Fellows of the Society.

Library.—In the Report for 1850 the Council had the satisfaction of intimating the preparation of a Catalogue, alphabetically arranged, of the books and pamphlets belonging to the Society, supplying a want long felt. In the 1852 Report, the revision and printing of the Catalogue was announced, and its issue to the Members of the Society made known in the Report of 1853. Subsequently, a classified Catalogue, arranged under the geographical divisions of the globe to which the works refer, having been prepared a few years since by Mr. F. Galton, and the manuscript additions made thereto consequent on the yearly accessions to the Library, having rendered the references somewhat difficult, the Council considered the reprinting of those useful works of reference so essential for facilitating access to the Library, that a revision has been undertaken, and the Council hope to be able to report at the ensuing Anniversary Meeting that they were completed, printed, and issued before the end of the year 1864.

Library Accessions.—Since the last Anniversary Meeting 71 volumes of books have been bound, and the Accessions to the Library by purchase and donation during the same period comprise 541 volumes of books and pamphlets. Of these 86 volumes have been purchased, a list of which is laid on the table.

Map-Room Accessions.—The additions to this department during the past year consist of 413 sheets of Maps and Charts, viz. 99 Charts and 314 Maps;* Philip's Atlas, complete; Part 3 of Atlas of High Asia by the Schlagintweits; Moll's Atlas (small size); 25 sheets of an Atlas of Fortified Towns; 2 Models and 5 Views. The Maps, &c., obtained by purchase have hitherto been but few in number.

Among the above may be especially noticed the following, viz.:—

Coello's Map of Spain, 10 sheets.
Belgium, Provinces of, on various scales, by Vander Maelen.
Sweden, 5 sheets of Geological Map, by A. Erdman.
Bavaria, 1 sheet of Government Atlas.
Angola, S. Africa, on 2 sheets, by Visconde de sa da Bandeira.
Island of Java, by W. F. Versteig.
Model of Gibraltar and of the Lines of Torres Vedras, by R. T. Wilde.
Two Ancient Maps of Africa, from Ptolemy's Atlas.
Bolivia, by J. Ondarza.
Indian Atlas, 13 sheets.
High Asia, and Buddhish in Tibet, by the Schlagintweits.
Hessen, Geological Map, 2 sheets.
Atlas der Industrie- und Handelsgeographie, 3 sheets.
Netherlands, 10 sheets of Topographical Atlas.
Admiralty Charts.
Maps from the Ordnance and Topographical Depôts.

Means used to enlarge the Map-Room Collection.—The Council continuing strongly impressed with the necessity of enlarging the Map collection, have received from the Secretaries of State for War, for India, and also the Admiralty, and from the Ministers of Foreign Governments, assurances that they will readily co-operate in adding to the Society's stock the Maps and Charts more recently published. They further add that, considering the liberality with which access to the Map-Room is given to the Public

* All of which have been mounted, and incorporated in the Society's collection.

and the great facilities thus afforded for diffusing information, the enlargement of the Society's stock is of national importance; and they appeal to the liberality of the Public and the Members for donations. The replies from the Secretaries of State for India and War, and the Admiralty, and from the Ministers and Ambassadors, as entered in Appendix D. will doubtless be read with great satisfaction: the Council are sanguine that the Officers and Government of India, and Colonel Sir H. James, will most readily respond to the authority given by the Secretary of State, and supply the Society with many valuable additions to the Map-Room. The contributions from the Foreign Governments will also furnish many books and maps at present greatly needed to fill up important blanks in our Collections.

The Council are also fully alive to the necessity of making available for this purpose some portion of the Government Donation of 500*l.* per annum; the object of the Grant being as stated in Vol. 24, page vi., viz.—"That Her Majesty's Ministers have felt themselves justified in tendering a yearly Grant of 500*l.*, in order that an apartment be provided in which the Society's valuable collection of Maps and Charts may be made available for general reference." And as this grant was made in 1854—ten years ago—and but a trifling sum has been as yet laid out in maps, &c., the Council are of opinion that by means of a considerable portion of the funds available, the Map-Room collection may be increased, and put into a more complete state than it at present is.

Instruments.—The importance of carrying out the original object of the Society, of procuring specimens of such instruments as experience has shown to be most useful and best adapted to the compendious stock of a traveller, will be kept in view.

In order to encourage the production of suitable instruments, such as experience has shown to be most useful and best adapted to the compendious stock of a traveller, the Council, in the Report of 1860, intimated (*vide* App. C.) that a prize of 50*l.*, or a Gold Medal, would be awarded to the designer or maker of the most serviceable reflecting instrument for the measurement of angles; but though the premium was announced in the two subsequent Annual Reports, yet, up to this date, no instrument of adequate merit has been offered to the Society. The Council propose to consider the Prize still open for competition, and measures will be taken to make the notice more generally known.

Since the last Anniversary, with a view to make the Instruments more accessible to travellers, a room has been set apart and the Instruments properly arranged, upon the recommendation of the Vice-President, Admiral R. Collinson. The list is on the table, and will be published with the Catalogues. Further arrangements are in contemplation for making the Collection more generally available and useful to all classes.

The Collection has been made by the donations of Members, and those articles that require repair will first be put into an efficient state, then being available for beginners to learn their use. The Instruments purchased by the Society are mostly lent to travellers, who still retain possession of them. (See page cv.)

Several of the London makers of Instruments are understood to be quite willing to deposit specimens of Instruments, after they have been verified at Kew Observatory as to completeness, thereby enabling the Council to carry out the 3rd Article of Regulations, as proposed at the formation of the Society, viz.—"To procure specimens of such Instruments as experience has shown to be most useful, and best adapted to the compendious stock of a traveller, by consulting which he may make himself familiar with their use." (See Vol. 1, page vi.)

In the Instrument-Room the additional supplies may be arranged in three or four sets to suit the requirements of the traveller (the prices being attached), and in cases with slings, ready for field use: a great convenience to those about to travel, and who, being limited as to time, would thereby save expense, and ensure for themselves good instruments instead of the indifferent ones they have now hurriedly to pick up where best they can.

Travellers, after using these instruments, may also be called upon to report on them and suggest improvements.

The preparation and completion of diagrams illustrating the use of Instruments and the laws of reflection, will be kept in view and the diagrams when constructed will be hung round the room.

Grants to Travellers.—The sum of 50*l.* was sent to M. Rohlfs Gerard on the 10th February, 1864, to assist him in his projected journey from Morocco towards Timbuctoo; and the Council have at present a proposal under the consideration of Government for the exploration of the Nile from Egypt, for which a sum of 1000*l.* will be made available.

APPENDIX A.

BALANCE-SHEET FOR THE YEAR 1863.

Dr.

	£.	s.	d.	£.	s.	d.
To Balance in Banker's hands, 31st Dec., 1863	1211	6	8			
To Balance in Secretary's hands	33	8	6	1244	15	2
Subscriptions of 1226 Fellows	2448	0	0			
Life Compositions of 43 Fellows	1071	0	0			
Entrance Fees of 214 Fellows	645	0	0			
Arrears of Subscriptions	163	6	0	4327	6	0
Parliamentary Grant	..	..		500	0	0
Subscriptions, &c., overpaid	..	..		2	1	0
Advertisements	..	..		56	9	3
Sale of Publications, &c.	..	..		65	8	8
Rent of Stables	..	..		40	0	0
Amount received for Stationery and Postage of Foreign Books	..	..		4	3	0
Half-year's Dividend on 8500*l.* New 3 per Cents..	122	14	5			
Half-year's Dividend on 9500*l.* New 3 per Cents..	138	6	11	261	1	4
Total				£6501	4	5

Cr.

	£.	s.	d.	£.	s.	d.
By Salaries	..	..		827	10	0
Wages, Collector's Pay and Gratuities (including 500*l.* voted to Dr. Norton Shaw by the Council, 25th May, 1863)	..	..		718	0	0
Rent, Taxes, and House Expenses ..	..	..		562	15	10
Library and Map Room	..	..		220	10	9
Publications and Illustrations	..	..		894	2	9
Office Expenses, &c.	..	..		286	9	9
Gold Medals, &c.	..	..		124	15	0
Subscriptions, &c., returned	..	..		21	0	0
Total Expenditure during 1863 ..	..	..		3655	4	1
Addition to Funded Property	..	..		1837	10	0
Balance in Banker's hands	991	1	8			
Balance in Chief Clerk's hands ..	17	8	8	1008	10	4
				2846	0	4
Total of Year's transactions				£6501	4	5

Audited the 30th March, 1864.

REGINALD T. COCKS, *Treasurer*.

T. H. BROOKING,
G. BALFOUR,
CHARLES WHITE. } *Auditors*.

APPENDIX B.

ESTIMATE FOR THE YEAR 1864.

Receipts.	£.	s.	d.	*Expenditure.*	£.	s.	d.
Cash Balance on 1st January, 1864	1008	10	4	Journal, Proceedings, and Publications	900	0	0
Annual Subscriptions	2600	0	0	Rent, Taxes, and House Expenses	600	0	0
Life Compositions	750	0	0	Salaries (for whole of Staff) and Wages	1100	0	0
Entrance Fees	360	0	0	Library and Map-Room	200	0	0
Arrears of Subscriptions	150	0	0	Office Expenses, Postage Stamps, &c.	300	0	0
Royal Premium Grant for 2 Years	105	0	0	Gold Medals and other Awards	100	0	0
Parliamentary Grant	500	0	0	Estimated Total of Cash Expenditure	3200	0	0
Sale of Publications, &c.	100	0	0	To be invested in Stocks	896	5	0
Dividends and small Receipts	400	0	0	Available for the furtherance of Geography	1110	0	0
				Cash Balance on 31st December, 1864	767	5	4
Total	£5973	10	4	Grand Total	£5973	10	4

APPENDIX C.

Prize of £50 or a Gold Medal to the Designer or Maker of the most serviceable Reflecting Instrument for the Measurement of Angles.

The Council of the Royal Geographical Society having taken into consideration the importance of Reflecting Instruments to practical geographers, and acting under the belief that many improvements in sextants and circles have been devised, both in this country and abroad, which are not generally known and have never been adequately combined in a single design, have determined to offer a prize of 50*l.* to the designer or maker of that Reflecting Instrument which shall in their opinion most nearly fulfil the following conditions, in addition to that of general accuracy:—

1. Portability; simplicity of packing; security from concussion.
2. Capability of measuring large angles.
3. Independence of natural or detached horizon.
4. Distinctness in reading off, by day and by night.
5. Convenience in handling; adaptability to stand for use in field.
6. Efficiency of adjustments.
7. Power of measuring faint objects.

The divided arc to be from 3 to 8 inches radius.

The instruments to be sent in cases, suited for immediate use in land travel.

The instruments will be received at the Society's rooms until the close of the present year.

APPENDIX D.

Copies of Letters relating to Maps and Charts.

Admiralty, 18 December, 1863.

SIR,—I have received and laid before my Lords Commissioners of the Admiralty your letter of the 14th inst., and I am commanded to acquaint you that orders have been given for the regular supply of *all Admiralty Charts* to the Map-room of the Royal Geographical Society, as requested by the Council.

I am, Sir, your very humble servant,

(Signed) W. G. ROMAINE.

To SIR RODERICK MURCHISON, &c.,
15, *Whitehall Place.*

Albert Gate House, 18 Dec. 1863.

L'Ambassadeur de France présente ses compliments à Sir Roderick Murchison, et a l'honneur de l'informer qu'il s'est empressé de transmettre à son Gouvernement le désir exprimé par la Société Royale de Geographie, qui faisait l'objet de la lettre de Sir Roderick Murchison en date du 14 de ce mois.

Legacion de Espana en Londres,
19 Dec. 1863.

SIR,—In answer to your favour, dated the 14th inst., in which you express your regret for not receiving of late years the Maps, Charts, and other Geographical and Topographical Works published by Her Catholic Majesty's Government, I have the pleasure to state to you that I shall lose no time in communicating, through Her Majesty's Government, with the proper Department on this subject, in order to ascertain the cause of the omission pointed out in your letter; and you may be persuaded that the Spanish Government will remedy such deficiencies, according to your desire, and provide for the transmission of future geographical publications.

I have the honour to be, Sir,
Your very obedient servant,
JUAN COMYN.

To SIR RODERICK MURCHISON.

Legation of Denmark, 2, Great Cumberland Street, W.
Dec. 21, 1863.

SIR,—I beg to acknowledge the receipt of your letter of the 14th inst., requesting that the Royal Geographical Society might be supplied with each Map, Chart, and other Geographical and Topographical Work as are published in Denmark, under the auspices of the Government.

I have not failed to submit this request to my Government and recommend that it be acted upon.

I have the honour to be, Sir,
Your obedient servant,

TUBEN BILLE.

To SIR R. MURCHISON, K.C.B., &c.

Ambassade de Russie à Londres,
Londres, le 23 Dec. 1863.

MONSIEUR,—En réponse à la lettre que vous m'avez fait l'honneur de m'adresser sous la date du 14 de ce mois, je m'empresse de vous faire savoir que j'ai porté à la connaissance du Gouvernement Impérial le désir que vous m'exprimez de la part de la Société Royale Geographique, relatif à la continuation de l'envoir de cartes et ouvrages géographiques et topographiques, publiés en dernier lieu sur l'Empire de Russie.

Dès que la reponse à se sujet me sera parvenue de St. Petersbourg je me ferai un agréable devoir de vous en informer, Monsieur, en vous priant de la porter à la connaissance de la Société Royale Geographique.

Recevez en attendant, Monsieur, l'assurance renouvelée de ma consideration trés destinguée.

E. BRUNNOW.

To SIR R. MURCHISON, K.C.B., &c.

Prussian Embassy, London, Jan. 5, 1864.

SIR,—In acknowledging the receipt of your letter of the 14th of last month, respecting the wish of the Council of the Royal Geographical Society for transmission of the Maps, Charts, and other Geographical and Topographical Works published in Prussia, I beg to inform you that I have communicated the contents of your letter to His Prussian Majesty's Government, and that I shall not fail to acquaint you of the result.

I have the honour to be, Sir,
Your obedient servant,

BERNSTORFF.

To SIR R. MURCHISON, K.C.B., &c.

Portuguese Legation, Jan. 2, 1864.

SIR,—Having returned a few days ago from the Continent, I had the honour to receive your letter of 14th Dec., and can assure you it will give me much pleasure to obtain from Lisbon the Maps, Charts, &c., you refer to; but as it would be very difficult to ascertain *there* what numbers are desired, I should feel much obliged if a list of the Charts, &c., already received by the Royal Geographical Society could be made out, or at least of those last received, and up to what time; by this means it would be more easy to comply with the wishes of the Royal Geographical Society, and I would lose no time in making their request known to my Government.

I have the honour to be, Sir,

Your most obedient servant,

(Signed) LAVRADIO.

To SIR R. MURCHISON, K.C.B.,
President of the R. G. S.

War Office, Pall Mall, S.W., Jan. 11, 1864.

SIR,—I am desired by Earl de Grey and Ripon to acknowledge receipt of your letter of the 14th ult., and to inform you that directions have been given to furnish the Royal Geographical Society with all the Maps on the one-inch scale and the six-inch scale, which appear to be deficient according to the list which accompanies your letter.

Earl de Grey desires me to add that the whole series of the six-inch and one-inch Maps will continue to be regularly supplied to the Royal Geographical Society as heretofore, immediately after their publication; but that His Lordship considers that the Maps of the Ordnance Survey on the larger scales cannot be required for the purposes of the Society.

I am further to inform you that Earl de Grey has directed that the Maps published by the Topographical Department of the War Office (as distinguished from the Ordnance Survey Office) shall also be furnished to the Royal Geographical Society.

I am, Sir, your obedient servant,

EDWARD LUGARD.

To SIR R. MURCHISON, K.C.B.,
President of the R. G. S.

Jan. 12, 1864.

SIR,—In reference to the list of deficiencies of the Ordnance Survey Maps required for the Royal Geographical Society, I have to inform you that Sheets 9, 11, 13, of the one-inch scale of Scotland cannot be supplied at present as the plates are in the battery, but that impressions will be forwarded as soon as possible.

Sheets 29, 39, and 57 are in the hands of the engravers, and cannot be supplied.

I have the honour to be, Sir,
Your obedient servant,

H. Helsham Jones, Capt. R.E.

The Secretary,
Royal Geographical Society, London.

India Office, S.W., 2nd April, 1864.

Sir,—I am directed by the Secretary of State for India in Council to acknowledge the receipt of your letter of the 6th of Feb. last, and to acquaint you in reply that Sir Charles Wood will have much pleasure in presenting to the Royal Geographical Society copies of such Maps published by the Indian Government in this country as can be spared, and that instructions have been sent to the Government of India to forward copies of the Maps which have been or may be published in India under the auspices of the Surveyor General's Department, for presentation to the Society.

I have the honour to be, Sir,
Your obedient servant,

Howard Melvill.

Sir R. Murchison, K.C.B., &c.

APPENDIX E.

Names of distinguished Foreigners, who have recently been added by the Council to the list of Honorary Corresponding Members of the Royal Geographical Society:—

Barth, Dr. Heinrich .. .. *Berlin.*

Gold Medallist of the Royal Geographical Society, author of many publications on African Geography. Now engaged in the issue of an elaborate treatise on the languages of Northern Africa. President of the Berlin Geographical Society.

Dufour, General .. .. *Berne.*

Director of the Topographical Department of Switzerland. The faithful Maps of that country, issued under his supervision, have earned the grateful acknowledgments of English travellers of widely different vocations.

Khanikof, M. .. .. *Russia.*

Eminent as an Asiatic traveller and geographer; author of a well-known work on Bokhara.

Linant Pasha .. .. *Alexandria.*

The earliest explorer of the White Nile, and otherwise distinguished as an Egyptian geographer.

Petermann, Dr. Augustus .. .. *Gotha.*

Originator and Editor of the well-known 'Mittheilungen;' in which capacity he has contributed, more than any other person in Germany, to disseminate a wide knowledge of sound geography.

Raimondy, Don Antonio .. .. *Lima.*

Author of a work on the Amazonian provinces of Peru. Now engaged in exploring the unknown parts of that Republic.

Scherzer, Dr. Karl, Ritter von .. .. *Vienna.*

Editor of the 'Voyage of the *Novara*.' Eminent as an American geographer and ethnologist.

Berbrugger, M. M. .. .. *Algiers.*

Author of 'Algérie historique et monumentale.' Editor of the 'Revue Africaine,' Algiers.

Dana, Professor J. D. .. .. *New Haven, Connecticut.*

Distinguished as a physical geographer and naturalist. Author of various memoirs, including essays on the Origin of the great features of the Earth.

DUVEYRIER, Henri .. .. *Paris.*

Known by his travels in the Sahara, notices of which have appeared from time to time in the Transactions of the French Geographical Society.

FAIDHERBE, Col., French Governor of the Senegal, West Africa— *Senegal, West Africa.*

Eminent for his successful encouragement of geographical enterprise in the French Colony of the Senegal.

FIGANIÈRE, Command. Jorgé César, Foreign Office, Lisbon *Lisbon.*

Distinguished for his researches into the ancient geographical records of the Portuguese Empire.

FORCHHAMMER, Professor .. .. *Kiel.*

Professor in the University of Kiel. Eminent for his writings on Denmark, on Greece, and on the Troad.

LEAL, José da Silva Mendes, Minister of the Colonies, Lisbon— *Lisbon.*

A statesman actively engaged in the development of the resources of the Portuguese possessions in Africa.

SCHEDA, Herr von .. .. *Vienna.*

Director of the Imperial Institute of Military Geography.

TSCHUDI, Herr von .. .. *Vienna.*

Traveller, naturalist, and writer on Peru. Author of a well-known work on Switzerland.

DECKEN, Baron Carl von der .. .. *Hanover.*

Explorer of Kilima-njaro in East Africa, to which region he is preparing a new Expedition at great cost, and wholly at his own expense.

FREMONT, General .. .. *New York.*

Explorer in the Rocky Mountains, and Gold Medallist of the Royal Geographical Society.

Library Regulations.

I. The Library will be open every day in the week (Sundays excepted) from 10·30 in the morning to 4·30 in the afternoon,* except on New-Year's Day, Good Friday to Easter Monday inclusive, and Christmas week; and it will be closed one month in the year, in order to be thoroughly cleaned, viz. from the first to the last day of September.

II. Every Fellow of the Society is entitled (*subject to the Rules*) to borrow as many as four volumes at one time.

Exceptions :—

1. Dictionaries, Encyclopædias, and other works of reference and cost, Minute Books, Manuscripts, Atlases, Books and Illustrations in loose sheets, Drawings, Prints, and unbound Numbers of Periodical Works, *unless with the special written order of the President.*
2. Maps or Charts, *unless by special sanction of the President and Council.*
3. New Works before the expiration of a month after reception.

III. The title of every Book, Pamphlet, Map, or Work of any kind lent, shall first be entered in the Library-register, with the borrower's signature, or accompanied by a separate note in his hand.

IV. No work of any kind can be retained longer than one month; but at the expiration of that period, or sooner, the same must be returned free of expense, and may then, upon *re-entry*, be again borrowed, provided that no application shall have been made in the mean time by any other Fellow.

V. In all cases a list of the Books, &c., or other property of the Society, in the possession of any Fellow, shall be sent in to the Secretary *on or before the* 1*st of July in each year.*

VI. In every case of loss or damage to any volume, or other property of the Society, the borrower shall make good the same.

VII. No stranger can be admitted to the Library except by the introduction of a Fellow, whose name, together with that of the Visitor, shall be inserted in a book kept for that purpose.

VIII. Fellows transgressing any of the above Regulations will be reported by the Secretary to the Council, who will take such steps as the case may require.

By Order of the Council.

---

* On Saturday the Library is closed at 2·30 P.M.

ROYAL GEOGRAPHICAL SOCIETY.

Patron.

HER MAJESTY THE QUEEN.

Vice-Patron.

H.R.H. THE PRINCE OF WALES.

COUNCIL.

(ELECTED 23RD MAY, 1864.)

President.

MURCHISON, Sir Roderick I., K.C.B., G.C.ST.S., M.A., D.C.L., V.P.R.S., G.S., and L.S., Director-General of the Geological Survey of Great Britain and Ireland, Trust. Brit. Mus., Hon. Mem. R.S. of Ed., R.I.A., Mem. Acad. St. Petersburg, Berlin, Stockholm, Brussels, and Copenhagen, Corr. Ins. Fr., &c. &c.

Vice-Presidents.

COLLINSON, Rear-Adm. R., C.B.
CRAWFURD, John, Esq., F.R.S.
RAWLINSON, M.-Gen. Sir Henry C., K.C.B.
STRANGFORD, Viscount.

Treasurer.

COCKS, Reginald T., Esq.

Trustees.

HOUGHTON, Lord.
TREVELYAN, Sir Walter C., Bart., &c.

Secretaries.

MARKHAM, Clements R., Esq., F.S.A.
OLIPHANT, Laurence, Esq.

Foreign Secretary.

HODGKIN, Thomas, Esq., M.D.

Members of Council.

ADDINGTON, Rt. Hon. H. U.
BALFOUR, Col. G., R.A., C.B.
BACK, V.-Adm. Sir G., D.C.L.
BROOKING, Thomas H., Esq.
CHURCHILL, Lord Alfred S., M.P.
COLCHESTER, Lord.
DUNDAS, Rt. Hon. Sir David, M.P.
DONOUGHMORE, the Earl of.
FERGUSSON, James, Esq, F.R.S.
FINDLAY, Alex. G., Esq.
FOX, Lieut.-Gen. C. R.
GALTON, Francis, Esq., F.R.S.
GRAHAM, Cyril C., Esq.
HALL, Rear-Adm. W. H., C.B., F.R.S.
HAMILTON, W. J., Esq., F.R.S., Pres. Geo. Soc.
NICHOLSON, Sir Charles, Bart.
SHEFFIELD, Earl of, F.R.S.
SEYMOUR, H. Danby, Esq., M.P.
SPOTTISWOODE, W., Esq., F.R.S.
WALKER, John, Esq.
WAUGH, M.-Gen. Sir A. Scott, F.R.S.

Bankers.

Messrs. COCKS, BIDDULPH, and Co., 43, Charing-cross.

Assistant Secretary and Editor of Transactions,

H. W. BATES, Esq.

HONORARY, AND HONORARY CORRESPONDING MEMBERS.

15th February, 1865.

HONORARY.

Brazil, H. I. Majesty Dom Pedro II., Emperor of .. .. .. Rio Janeiro
Egypt, The Viceroy of .. .. Alexandria
Russia, His Imperial Highness the Grand Duke Constantine, Pres. Imp. Geo. Soc. of .. .. St. Petersburg
Sweden and Norway, His Majesty Carl Ludwig Eugène, the King of.. Stockholm
Tuscany, His Imperial Highness the Grand Duke of .. .. Vienna

HONORARY CORRESPONDING.

Abich, Prof. Hermann .. St. Petersburg
Akrell, Gen. Carl, Topo. Corps of Sweden, Stockholm
Baer, Chev. de K. E., Mem. Imp. Acad. of Science .. .. St. Petersburg
Balbi, M. Eugène de .. .. .. Milan
Barth, Dr. H. .. .. Berlin
Berbrugger, M. M. .. .. .. Algiers
Berghaus, Prof. Heinrich .. .. Berlin
Burmeister, Dr. Hermann Buenos Ayres
Carrasco, Capt. Don Edwards .. Lima
Chaix, Prof. Paul .. .. .. Geneva
Coello, Don Francisco .. .. Madrid
Dana, Prof. J. D., New Haven, Connecticut
D'Avezac, M... .. .. Paris
Decken, Baron Carl von .. .. Hanover
De la Roquette, M., v.p. Geogr. Soc., Paris
Dufour, Gen., Director of the Topo. Depart., Switzerland .. .. .. Geneva
Duperry, Admiral.. .. .. .. Paris
Duveyrier, M. Henri .. .. .. Paris
Ehrenberg, C. P., For. m.r. and l.s., Berlin
Erman, Prof. Adolph .. .. .. Berlin
Faidherbe, Col., French Gov. of the Senegal .. .. West Africa
Figanière, Command. Jorgé César, Foreign Office, Lisbon
Forchhammer, Prof. in the University of Kiel
Fremont, General .. .. .. New York
Grinnell, Henry, Esq. v.p. Geogr. Soc. of.. .. .. New York
Haidinger, Dr. William, v.p. Imp. Geogr. Soc. of .. .. Vienna
Hanstein, Prof., For. m.r.s.. Christiania
Hartstene, Capt. H. J., u.s.n., Washington
Hazelius, Col. J. A., Chief of the Topo. Corps of Sweden .. .. .. Stockholm
Helmersen, Col. P. .. St. Petersburg
Hügel, Baron Ch. .. .. .. Brussels
Irminger, Capt. C. L. C., r.d.n., Copenhagen
Jochmus, Gen. Baron .. .. .. Vienna
Kennelly, D. J. Esq., Sec. to the Bombay Geogr. Soc. .. .. Bombay
Khanikof, M. .. .. St. Petersburg
Kiepert, Dr. H. .. .. Berlin
Kupffer, M. A. T., Mem. Acad. of Science St. Petersburg
Leal, José da Silva Mendes, Minister of the Colonies .. .. Lisbon
Linant Pasha .. .. .. Alexandria
Livingstone, David, Esq., m.d., ll.d.
Macedo, J. J. da Costa de .. .. Lisbon
Madoz, Don Pascual .. .. .. Madrid
Malte-Brun, M. V. A., Sec. Geogr. Soc. of.. .. .. Paris
Martius, Dr. Charles.. .. .. Munich
Maury, Commodore M. F.
Negri, Signor Cristoforo .. .. Turin
Nordenskiold, Prof. Nils .. Helsingfors
Petermann, Dr. Augustus .. .. Gotha
Philippi, Dr. Rodulfo Armando .. Chili
Raimondy, Don Antonio.. .. .. Lima
Ranuzzi, Count Annibale .. .. Bologna
Rüppell, Dr. E., For. m.l.s... Frankfort
Scheda, Herr von, Director of the Imp. Inst. of Military Geogr. .. .. Vienna
Scherzer, Dr. Karl, Ritter von .. Vienna
Schomburgk, Sir R. H... .. .. Siam
Schoolcraft, H. R. Esq... United States
Sonklar, Lieut.-Col. the Chev. .. Vienna
Struve, Prof. Otto, Imp. Observ. of Pulkowa .. .. St. Petersburg
Swart, the Chevalier J. .. Amsterdam
Tchihatchef, M. Pierre de, St. Petersburg
Tschudi, Herr von .. .. .. Vienna
Vander Maelen, Mr. Ph. .. Brussels
Worcester, J. E., Esq... Cambridge, U.S.
Wrangell, Admiral Baron, St. Petersburg
Ziegler, M. J. M. .. .. Winterthur

FELLOWS.

(To 15th February, 1865.)

N.B.—*Those having * preceding their names have compounded for life.*

Year of Election.	
1863	Abdy, Rev. Albert, M.A. 4, *Grove-place, High Cross, Tottenham.*
1860	À Beckett, Arthur M., Esq., F.R.C.S.E., 15, *Uxbridge-road, Surbiton, S.W.*
1851	Abinger, W. F. Scarlett, Lord. 70, *Jermyn-street, S.W.*
1865	Achison, Frederick, Esq., C.E. 7, *College-hill, Highbury-park, North, N.*
1855	Acland, Prof. Henry Wentworth, M.D. *Oxford.*
1861	Acland, J. Barton Arundel, Esq. *Mount Peel, Canterbury, New Zealand.*
1853	Acland, Sir Peregrine Palmer F. P., Bart. *Fairfield, Somerset.*
1830	*Acland, Sir Thomas Dyke, Bart., F.R.S. *Waterloo-hotel, Jermyn-street, S.W.; and Killerton, Exeter, Devon.*
1862	Adams, Edwin, Esq.
1861	10 Addington, Right Hon. H. U. 78, *Eaton-place, S.W.*
1862	Addison, Col. Thomas, C.B. *Aldershot.*
1860	Agnew, Sir Andrew, Bart., M.P. *Lochnaw-castle, Wigtownshire.*
1859	Ainslie, Col. H. Francis. *Junior United Service Club, S.W.; and Burlington-chambers,* 180, *Piccadilly, W.*
1830	*Ainsworth, W. Francis, Esq., F.S.A. *Ravenscourt-villa, New-road, Hammersmith, W.*
1859	Airlie, David Graham, Earl of. *Holly-lodge, Kensington, W.*
1860	Aitchison, David, Esq. 180, *Piccadilly, W.*
1830	*Albemarle, George Thomas, Earl of. 11, *Grosvenor-square, W.; Quiddenham-hall, Larlingford, Norfolk; and Elvedon-hall, Suffolk.*
1862	Alcock, Sir Rutherford, K.C.B. 10, *Halfmoon-street, Piccadilly, W.*
1834	*Alcock, Thomas, Esq., M.P. *Kingswood-warren, near Epsom, Surrey.*
1838	20*Aldam, William, Esq. *Frickley-hall, near Doncaster.*
1857	Aldrich, Captain Robert D., R.N. *Windmill-road, Croydon, Surrey, S.*
1830	Alexander, Colonel Sir Jas. Ed., K.L.S., F.R.A.S., etc., 14th Regt. *United Service Club, S.W.; and Westerton-house, Bridge of Allan, N.B.*
1864	Allan, C. H., Esq. *Lloyd's, E.C.; and* 31, *Park-street, Stoke Newington, N.*
1857	Allan, George W., Esq. *Toronto, Canada.*
1858	Allan, Jas., Esq. 122, *Leadenhall-street, E.C.*
1859	Alsager, Thos. H., Esq. *Reform Club, S.W.; and Chislehurst, Kent.*

Year of Election.	
1854	Ancona, J. S., Esq. 8, *John-street, Adelphi, W.C.*
1860	Anderdon, John Edmund, Esq. 4, *Stanhope-street, Hyde-park-gardens, W*
1863	Anderson, Arthur, Esq. *Norwood-grove, Norwood, S.*
1862	30 Anderson, James, Esq. 1, *Billiter-court, City, E.C.*
1861	Anderson, John, Esq. *Shanghai.*
1861	*Anderson, Col. W., C.B. 19, *Gloucester-square, Hyde-park, W.*
1856	*Andrew, William P., Esq.
1861	Annesley, Col. the Hon. Hugh, M.P. 25, *Norfolk-street, Park-lane, W.*
1860	*Anson, Sir John William Hamilton, Bart. 55, *Rutland-place, S.W.*
1853	Ansted, Prof. D. T., M.A., F.R.S., etc. *Athenæum Club, S.W.; and Bonair St. Martin, Guernsey.*
1864	Anstey, G. A., Esq. 14, *Sussex-gardens, Hyde-park, W.*
1857	Anstruther, M.-Gen. Philip, C.B., Madras Artil. 1, *Chapel-street, Grosvenor-place, S.W.*
1864	Anstruther, Lieut. R. L. *Gibraltar.*
1830	40*Antrobus, Sir Edmund, Bart. 146, *Piccadilly, W.; Lower Cheam, Epsom, Surrey; and Amesbury, Wilts.*
1863	Arber, Edward, Esq., A.K.C., F.S.A. *Admiralty, W.C.; and* 13, *Little Stanhope-street, Mayfair, W.*
1858	Arbuthnot, George, Esq. 23, *Hyde-park-gardens, W.*
1862	Arbuthnot, Lieut. George, R.H.A. *Cowarth, Sunningdale.*
1860	Arcedeckne, Andrew, Esq. 35, *Albemarle-street, W.*
1861	Archer, Graves Thos., Esq. 1, *Ennismore-place, Prince's-gate, S.W.*
1855	*Arden, Richard Edward, Esq. *Sunbury-park, Middlesex, S.W.*
1858	*Armistead, Rev. Charles John, M.A., F.S.A. *University Club, S.W.; National Club, S.W.; and Roundhay, near Leeds; H.M.S. 'Pembroke,' Harwich.*
1863	Armitage, Edward, Esq. 3, *Hall-road, St. John's-wood, N.W.*
1857	Armstrong, Alexander, Esq., M.D., R.N., F.R.C.P., Deputy Inspector-General Royal Naval Hospital, Malta. *H.M.S. 'Pembroke,' Harwich; and Junior United Service Club, S.W.*
1830	50*Arrowsmith, John, Esq., F.R.A.S. 35, *Hereford-square, Old Brompton, S.W.*
1864	Arthur, John, Esq. 101, *Hill-street, Breadalbane-terrace, Glasgow.*
1863	Arthur, Commander William, R.N. *H.M.S. 'Excellent,' Portsmouth.*
1858	Ashburton, Lord. 16, *St. James's-square, S.W.*
1864	*Ashton, R. J. Esq. 39, *Lombard-street, E.C.*
1853	*Ashwell, James, Esq., M.A., F.G.S.
1851	Astley, Francis D. P., Esq., M.R.I. 67, *Eaton-square, S.W.*
1830	*Atkins, John Pelly, Esq., F.S.A. *Halsted-house, near Sevenoaks.*
1860	Attwell, Professor Henry. *Barnes, S.W.*
1839	Attwood, Matthias Wolverley, Esq. 27, *Gracechurch-street, E.C.*
1861	60 Aubin, William, Esq. 3, *Furnival's-inn, Holborn, E.C.*
1859	Austen, Capt. Henry H. Godwin, 24th Foot, Trig. Survey, Panjab. *Junior United Service Club, S.W.; and Chilworth-manor, Guildford, Surrey.*
1863	Austin, John G., Esq. 45, *Porchester-terrace, W.*

Year of Election.		
1863		Austin, Rear-Admiral Horatio T. *Malta.*
1854		Ayrton, Acton S., Esq., M.P. 3, *Essex-court, Temple, E.C.*
1845		*Ayrton, Frederick, Esq.
1836		*Back, Vice-Adm. Sir Geo., D.C.L., F.R.S. 109, *Gloucester-place, Portman-sq., W.*
1863		*Backhouse, John Henry, Esq. *Darlington.*
1864		Badger, Rev. Geo. P. 17, *Dawson-place, Bayswater, W.*
1863		Bagot, Christopher N., Esq. *Oriental Club, W.*
1862	70	Bagot, Capt. L. H. 55, *Inverness-terrace, W.*
1859		Bailey, L. C., Esq., Staff Commander, R.N. *Topographical Department, New-street, Spring-gardens, S.W.*
1857		Baillie, Major John, Bengal Staff Corps. *Jhansi, Central India.*
1862		Baillie, John B., Esq. *Leys-castle, Inverness.*
1861		Baillie, William Henry, Esq. 67, *Eaton-square, S.W.*
1861		*Baker, John, Esq.
1862		Baker, Capt. Robert B.
1855		Baker, Capt. Wm. T., 85th Regt. *Junior United Service Club, S.W.; and* 31, *Grosvenor-place, Bath.*
1861		Baldwin, William Charles, Esq. *Leyland-vicarage, Preston.*
1861		Balfour, David, Esq. *Balfour-castle, Kirkwall, N.B.*
1847	80	Balfour, Colonel George, R.A., C.B. 2, *York-street, Portman-square, W.; and Oriental Club, Hanover-square, W.*
1853		Balfour, John, Esq *New South Wales; and Colinton, Queensland.*
1863		Balfour, John Osborn, Esq. 26, *Inverness-terrace, W.*
1863		Balfour, William, Esq. *Mr. Nudd's*, 83, *Connaught-terrace, Edgware-road.*
1860		Ball, John, Esq. *Oxford and Cambridge Club, S.W.*
1863		Bamforth, Rev. J., Principal of Doveton College. *Madras.*
1852		Bancroft, Capt. W. C., 16th Regt. *Aide de Camp and Military Sec., King's House, Jamaica; M'Gregor and Co., Charles-street, S.W.*
1862		Banks, George F., Esq., Surgeon, R.N. *Llandudno, North Wales.*
1840		*Barclay, Arthur Kett, Esq., F.R.S. *Park-street, Southwark, S.E.; and Bury-hill, Dorking, Surrey.*
1863		Barford, A. H., Esq., M.A. 1, *Cornwall-terrace, Regent's-park, N.W.*
1863	90	Baring, Alexander, Esq. 58, *Lowndes-square, S.W.*
1838		Baring, Rt. Hon. Sir Francis T., Bart., M.P., F.R.S. *Stratton-park, Andover, Hants.*
1835		*Baring, John, Esq. *Oakwood, Chichester.*
1844		*Baring, Thomas, Esq., M.P. 41, *Upper Grosvenor-street, W.*
1862		Barlee, Frederick Palgrave, Esq. *Perth, Western Australia.*
1853		Barnett, Capt. Edward, R.N. 14, *Woburn-square, W.C.*
1864		Barnett, H. C., Esq. *St. Ann's, Blarney, Cork.*
1858		Barratt, James, Esq. *Lymme-hall, near Harrington, Cheshire.*
1862		Barrett-Lennard, Capt. C. E. 7, *Albemarle-street, W.*
1859		Barrington, the Hon. George. 19, *Hertford-street, Mayfair, W.*

Year of Election.		
1833	100	Barrow, John, Esq., F.R.S., F.S.A. 17, *Hanover-terrace, Regent's-park, N.W.*
1863		Barry, Alfred, Esq. *Beckenham, Kent, S.W.*
1856		Barth, Heinrich, Esq., PHIL. DR. *Berlin.*
1857		Bartholomew, John, Junr., Esq. 4, *North-bridge, Edinburgh.*
1861		Bartlett, Herbert Lewis, Esq. 3, *King-street, St. James's, S.W.*
1862		Barton, Dr. Alfred. *Oriental Club, W.*
1864		Baseri, Capt. J. P., R.E. 100, *Belgrave-road, S.W.; Messrs. Grindlay & Co., Parliament-street, S.W.*
1837		*Bateman, James, Esq., F.R.S., L.S. *Knypersley-hall, Staffordshire.*
1859		Bateman, John F., Esq., C.E. 16, *Great George-street, Westminster, S.W.*
1843		Bathoe, Charles, Esq. 28, *York-place, Portman-square, W.*
1864	110	Bax, Capt. Henry G. 2, *Sussex-place, Hyde-park-gardens, W.*
1858		Baxendale, Joseph H., Esq. 14, *Chester-terrace, Regent's-park, N.W.; and Scott's-bridge, near Rickmansworth, Herts.*
1863		Bayley, H. Esq. *Blackheath-park, Kent.*
1862		Bayly, Lieut.-Col. John, R.E. *Ordnance Survey Office, Glasgow; and* 131, *St. George's-road, Pimlico, S.W.*
1862		Baynes, Lieut.-Col. R. Stuart. *Army and Navy Club, S.W.; and* 38, *Jermyn-street, S.W.*
1852		Beardmore, Nathaniel, Esq., C.E. 30, *Great George-street, Westminster, S.W.*
1858		Beauclerk, Aubrey de Vere, Esq. *Ardglass, Co. Belfast.*
1854		Beaufort, William Morris, Esq., Bengal Civil Service. *Bengal.*
1856		Beaumont, John Aug., Esq. *Wimbledon-park-house, Wimbledon, S.W.; and* 50, *Regent-street, W.*
1851		*Beaumont, Wentworth B., Esq., M.P. 144, *Piccadilly, W.; Bywell-hall, Newcastle-upon-Tyne; and Bretton-park, Wakefield.*
1863	120	Beavan, Hugh J. C., Esq., F.A S.L. *Grafton Club, W.; and* 13, *Blandford-square, Regent's-park, N.W.*
1830		Becher, Capt. Alex. B., R.N. *Admiralty, S.W.; and* 13, *Dorset-place, Dorset-sq., N.W.*
1861		Beckett, James F., Esq., Staff Commander, R.N., F.R.S.A. 6, *Boyne-terrace, Notting-hill, W.*
1838		*Beckford, Francis L., Esq. *Travellers' Club, S.W.*
1859		Bedford, Capt. G. Augustus, R.N. 5, *Ormond-terrace, Regent's-park, N.W.*
1860		Beeton, Samuel Orchart, Esq. 248, *Strand, W.C.; and Pinner, Middlesex, W.*
1861		*Begbie, James, Esq. 27, *Mark-lane, E.C.*
1860		Begbie, Thomas Stirling, Esq. 4, *Mansion-house-place, E.C.*
1846		Beke, Charles Tilstone, Esq., PH. DR., F.S.A., &c. *Bekesbourne-house, near Canterbury; and Cambridge-heath, Hackney, N.E.*
1853		Belcher, Rev. Brymer. *St. Gabriel's, Pimlico, S.W.*
1830	130	*Belcher, Rear-Adm. Sir Edward, C.B., F.R.A.S. 7, *Norland-square, W.*
1858		Beldam, Edw., Esq. 1, *Stone-buildings, Lincoln's-inn, W.C.; and Royston, Herts.*
1848		Beldam, Joseph, Esq. *Royston, Herts.*
1863		Belmore, The Earl of. *Dover-street, Piccadilly, W.*
1863		*Bell, Charles, Esq. *Richmond.*

Year of Election.		
1858		Bell, C. Davidson, Esq., Surveyor-General, Cape of Good Hope. *Cape Town.*
1850		*Bell, James, Esq. 1, *Devonshire-place, Portland-place, W.*
1830		*Bell, James Christian C., Esq. 42, *Westbourne-terrace, W.; and* 15, *Angel-court, Throgmorton-street, E.C.*
1864		Bellamy, Edward, Esq. 1, *St. George's-road, Eccleston-square, W.*
1830		*Bennett, John Joseph, Esq., F.R.S. *British Museum, W.C.*
1857	140	Bennett, J. Risdon, Esq., M.D. 15, *Finsbury-square, E.C.*
1856		*Benson, Robert, Esq. 16, *Craven-hill-gardens, Bayswater, W.*
1856		*Benson, William, Esq., Barrister-at-Law. *Oxford and Cambridge Club, Pall Mall, S.W.*
1830		Bentham, George, Esq., Pres. L.S. 25, *Wilton-place, S.W.*
1833		Bentley, Richard, Esq. *New Burlington-street, W.*
1859		Berens, H. Hulse, Esq. *Sidcross, Foot's Cray, Kent.*
1861		Berkley, George, C.E. 24, *Great George-street, S.W.*
1856		Berry, Josiah, Esq. 16, *Regent-square, W.C.*
1863		Best, William, Esq. 85, *Oxford-terrace, Hyde-park, W.*
1842		*Bethune, R.-Admiral C. R. Drinkwater, C.B. 56, *Westbourne-ter., Hyde-park, W.*
1864	150	Betts, E. L., Esq. *Preston-hall, Maidstone, Kent.*
1836		Betts, John, Esq. 115, *Strand, W.C.*
1862		Bicker-Caarten, Peter, Esq. 30, *Northumberland-place, Bayswater, W.*
1860		Bidder, G. Parker, Esq., C.E. 24, *Gt. George-st., S.W.; and Mitcham, Surrey, S*
1863		Bigg, Thos., Esq. *Cronstadt-house, Abbey-wood, Kent.*
1859		Bigge, Frederick W., Esq. *Union Club, S.W.*
1850		Bigsby, John J., Esq., M.D. 89, *Gloucester-place, Portman-square, W.*
1864		Bingham, P., Esq. *Athenæum Club, S.W.*
1858		Birch, Augustus F., Esq., M.A. Fellow of King's College, Cambridge; Assistant Master, Eton College.
1860		Birch, H. W., Esq. 46, *Welbeck-street, Cavendish-square, W.*
1858	160	Birch, John William, Esq. 9D, *New Broad-st., E.C.; and* 27, *Cavendish-sq., W.*
1859		Birch, Capt. Thomas, R.N. *United Service Club, S.W.*
1862		*Birchill, B. H. H., Esq. *St. Stephen's, Bedfont, near Hounslow.*
1858		Bishop, George, Esq., F.R.A.S. *Union Club, S.W.; and The Meadows, Twickenham, S.W.*
1861		Bishop, James, Esq.
1836		*Blaauw, William H., Esq., M.A., F.S.A., F.Z.S. *Beechlands, near Uckfield, Sussex.*
1860		*Black, Francis, Esq. 6, *North-bridge, Edinburgh.*
1858		Blackett, Henry, Esq. 13, *Great Marlborough-street, W.*
1849		Blackie, W. Graham, Esq., PH. DR. 36, *Frederick-street, Glasgow.*
1861		*Blackney, William, Esq., Assistant-Paymaster, R.N. *H.M.S. 'Actæon.' Millbrook, Devonport.*
1857	170	Blackstone, Alan C., Esq. *Board of Works, Whitehall-place, S.W.*
1862		*Blackstone, Frederick Elliot, Esq., B.C.L. *British Museum, W.C.*
1854		Blaine, D. Roberton, Esq., Barrister-at-Law. 3, *Paper-buildings, Temple, E.C.; and* 8, *Southwick-place, Hyde-park-square, W.*

Year of Election.		
1857		*Blake, Wollaston, Esq. 8, *Devonshire-place, W.*
1859		Blakeley, Capt. Alexr., R.A. 34, *Montpelier-square, Rutland-gate, S.W.*
1857		Blakiston, Captain Thomas, R.A. 28, *Wellington-street, Woolwich, S.E.*
1830		*Blanshard, Henry, Esq., F.R.A.S. 53, *Chancery-lane, W.C.*
1861		*Blanshard, Henry, Esq. *Upper Bedford-place, W.C.*
1857		Blanshard, Richard, Esq. *Fairfield, Lymington, Hants.*
1865		Blaxall, Fras. H., Esq., M.D. *H.M.S. 'Urgent,' Portsmo th.*
1854	180	Blencowe, W. Robert, Esq. *The Hook, Lewes.*
1861		Blenkin, William, Esq. *Addlestone, near Chertsey, Surrey.*
1839		*Blewitt, Octavian, Esq. 4, *Adelphi-terrace, Strand, W.C.*
1852		Block, Samuel Richard, Esq. *Green-hill, near Whetstone, Herts.*
1864		Blore, Edward, Esq. 4, *Manchester-square, W.*
1861		Bloxsome, Oswald J., Esq. *Clarence-house, Bognor, Sussex.*
1837		*Blunt, Jos., Esq.
1863		*Blunt, Wilfred, Esq.
1858		Bohn, Henry G., Esq. *York-st., Covent-garden, W.C.; and North-end-house, Twickenham, S.W.*
1863		Boileau, Sir John P., Bart., F.R.S. 30, *Upper Brook-street, W.*
1862	190	Bolton, Capt. Francis John, 12th Regt. *Chatham.*
1861		Bompas, George Cox, Esq. 15, *Stanley-gardens, Kensington-park, W.*
1864		Bone, J. W., Esq., B.A., F.L.S. 41, *Bedford-square, W.C.*
1861		Bonney, Charles, Esq. *Adelaide, Australia.*
1858		Bonnor, George, Esq. 49, *Pall-mall, S.W.; and 2, Bayswater-terr., Kensington-square, W.*
1859		Borough, Sir Edward, Bart. 4, *Nassau-street, Dublin.*
1845		*Borrer, Dawson, Esq. *Altmont Ballon, Co. Carlow, Ireland.*
1856		*Botcherby, Blackett, Esq., M.A. 48, *Brompton-row, S.W.*
1858		*Botterill, John, Esq. *Flower-bank, Burley-road, Leeds.*
1860		Boustead, John, Esq. 34, *Craven-street, Strand, W.C.*
1865	200	Bouverie, P. P., Esq. 16, *Hill-street, Berkeley-square, W.*
1855		Bovet, Charles, Esq. 30, *Camden-road-villas, N.W.*
1861		*Bowen, Charles Christopher, Esq. *Christchurch, Canterbury, New Zealand.*
1854		*Bowen, Sir George Ferguson, K.C.M.G., M.A. *Governor of Queensland, Australia.*
1836		Bower, George, Esq. 6, *Tokenhouse-yard, E.C.*
1862		Bowie, John, Esq. *Conservative Club, S.W.*
1833		Bowles, Admiral William, C.B. 8, *Hill-street, Berkeley-square, W.*
1856		Bowman, John, Esq. 9, *King William-street, E.C.*
1862		Boyce, Rev. W. B., Secretary to Wesleyan Missionary Society. 38, *Milner-sq. Islington, N.; and Wesleyan Mission House, Bishopsgate-street, E.C.*
1845		*Boyd, Edward Lennox, Esq., F.S.A. 35, *Cleveland-square, Hyde-park, W.*
1856	210	Boyne, G. Hamilton-Russell, Viscount. 22, *Belgrave-square, S.W.; Brancepeth-castle, Durham; and Burwarton-hall, Ludlow, Salop.*
1851		Bracebridge, Charles Holte, Esq. *Atherstone, Warwick.*
1858		Braddell, Thomas, Esq. *Magistrate at Penang.*

Year of Election.	
1862	Braithwaite, Isaac, Esq. 68, *Old Broad-street, E.C.*
1863	*Bramley-Moore, John, Esq., M.P. *Langley-lodge, Gerrard's Cross, Bucks.*
1857	Bramston, Thos. W., Esq., M.P. *Carlton Club, S.W.; and Skreens, Chelmsford, Essex.*
1859	*Brand, James, Esq. 109, *Fenchurch-street, E.C.*
1860	Brassey, T., Esq. 4, *Great George-street, S.W.; and* 56, *Lowndes-square, S.W.*
1857	Brasted, Rev. J. B.
1859	Braybrooke, Philip Watson. *Assistant Colonial Secretary, Ceylon.*
1861	220 *Brenchley, Julius, Esq. *Oxford and Cambridge Club, S.W.; and Milgate, near Maidstone, Kent.*
1846	Brereton, Rev. C. D., M.A. *Little Massingham, Rougham, Norfolk.*
1833	*Brereton, Rev. John, LL.D., F.S.A. *Bedford.*
1834	*Breton, William Henry, Esq., Lieut. R.N., M.R.I. 15, *Camden-place, Bath.*
1862	Brett, Charles, Esq. 44, *Cleveland-square, W.*
1858	Bridges, Nathaniel, Esq. 16, *Southwick-crescent, Hyde-park, W.*
1852	*Brierly, Oswald W., Esq. 8, *Lidlington-pl., Harrington-sq., Hampstead-rd., N.W.*
1861	*Bright, Sir Charles T., F.R.A.S. 1, *Victoria-street, Westminster, W.; and* 12, *Upper Hyde-park-gardens, W.*
1860	Bright, James, Esq., M.D. 4, *Caledonian-place, Clifton, Bristol.*
1854	Brine, Capt. Frederic, R.E. *Army and Navy Club, S.W.; Claremont, Sidmouth; and Hong-Kong, China.*
1856	230 Brine, Commander Lindesay, R.N. *Army and Navy Club, S.W.; Royal Naval College, Portsmouth; and Claremont, Sidmouth.*
1861	Bristowe, Henry Fox, Esq. 53, *Rutland-gate, S.W.*
1861	Broadwater, Robert, Esq. 3, *Billiter-square, Fenchurch-street, E.C.*
1864	Brodie, G. S., Esq. 27, *Pembridge-square, W.*
1861	Brodie, Walter, Esq. 13, *Delamere Terrace, Hyde-park, W.*
1861	Brodie, William, Esq. *Eastbourne, Sussex.*
1863	*Brodrick, George C., Esq. 32A, *Mount-street, W.*
1838	Brooke, Sir James, K.C.B., D.C.L. *Burrator, Horrabridge, S. Devon; Athenæum Club, S.W.; and Sarawak, Borneo.*
1864	Brooke, Sir Victor A., Bart. *Colebrooke-park, Co. Fermanagh, Ireland.*
1856	Brooke, Captain William, 30th Regt. 1, *Clifton-terrace, Ramsgate.*
1862	240 Brookes, Thomas, Esq. *Mattock-lane, Ealing, W.*
1856	*Brooking, George Thomas, Esq. 25, *Sussex-gardens, Hyde-park, W.*
1856	*Brooking, Marmaduke Hart, Esq. 11, *Montagu-place, Bryanston-square, W.*
1843	*Brooking, Thomas Holdsworth, Esq. 14, *New Broad-street, City, E.C.; and* 5, *Norfolk-crescent, Hyde-park, W.*
1863	Brophy, C. A., Esq. *Sidmouth.*
1863	*Broughall, William, Esq. *Broadwater, Down, Tunbridge-Wells.*
1850	Broughton, John, Lord, G.C.B., M.A., F.R.S. 42, *Berkeley-square, W.; and Erlestoke-park, Westbury, Wilts.*
1859	Broughton, L. P. Delves, Esq. 73, *Belgrave-road, S.W.*
1856	*Brown, Daniel, Esq. *The Elms, Larkhall-rise, Clapham, S.*
1864	Brown, Edwin, Esq., F.G.S. *Burton-on-Trent.*

Year of Election.		
1863	250	Brown, James, Esq., M.P. *Rossington, Yorkshire.*
1860		Brown, Jas. P., Esq. 80, *Cornhill, E.C.; and Sierra Seara de Cocaes, Minas Geraes, Brazil.*
1865		Brown, James R., Esq., F.R.S.N.A. Copenhagen. *Scaleby Lodge,* 241, *Camden-road, N.*
1861		*Brown, John Allen, Esq. 3, *Newcastle-place, Clerkenwell, E.C.; and Scaleby-lodge, Camden-road, N.*
1856		*Brown, Samuel, Esq. 11, *Lombard-st., E.C.; and The Elms, Larkhall-rise, Clapham, S.*
1858		*Brown, Thomas, Esq. 8, *Hyde-park-terrace, Hyde-park, W.*
1859		Brown, William, Esq. *Loat's-road, Clapham-park, S.*
1863		Browne, H. H., Esq. 70, *Westbourne-park-villas, Harrow-rd., Paddington, W.*
1862		Browne, John Comber, Superintendent and Inspector of Government Schools. *Port Louis, Mauritius.*
1858		Browne, John H., Esq. *Port Gawler, S. Australia.*
1864	260	Browne, Capt. Wade. 6, *Charles-street, Berkeley-square, W.*
1858		Browne, William J., Esq. *Port Gawler, S. Australia.*
1852		Browning, Henry, Esq. 72, *Grosvenor-street, W.; and Ampton-hall, Bury St. Edmund's.*
1856		*Browning, Thomas, Esq. 6, *Whitehall, S.W.*
1859		Bruce, Henry Austin, Esq., M.P. *Duffryn, Aberdare, Glamorganshire.*
1864		Bruce, Samuel, Esq. *Thorndale, Belfast.*
1863		Brunton, John, Esq., M.I.C.E., F.G.S.
1856		Bryant, Walter, Esq., M.D., F.R.C.S. 7, *Bathurst-street, Hyde-park-gardens, W.*
1844		Bryden, William, Esq. 6, *Great Queen-street, Westminster, S.W.*
1843		*Buchan, John Hitchcock, Esq. *The Grove, Hanwell, W.*
1863	270	Buchanan, Walter, Esq., M.D. 9, *James-street, Buckingham-gate.*
1859		Buckland, Edward C., Esq. 36, *Lansdowne-road, Notting-hill, W.*
1863		Budd, J. Palmer, Esq. 9, *Sussex-place, W.*
1863		Bullock, Commander Charles J., R.N. *Hydrographic Office, S.W.*
1830		*Bullock, Rear-Admiral Frederick. *Woolwich, S.E.*
1864		Bullock, W. H., Esq. *Grosvenor-hill, Wimbledon, S.W.*
1860		*Bunbury, Sir Charles James Fox, Bart.; F.R.S. *Barton-hall, Bury St. Edmund's.*
1839		Bunbury, E. H., Esq., M.A. 35, *St. James's-street, S.W.*
1860		Bunyon, C. J., Esq. 4, *Queen's-terrace, Queen's-gate, Kensington-gore, W.*
1861		Burges, William, Esq. *Fethard, Co. Tipperary.*
1863	280	Bundock, F., Esq. *Windham Club, S.W.*
1863		Burgoyne, Capt. Hugh Talbot R.N., V.C. 8, *Gloucester-gardens, Hyde-park, W.*
1864		Burn, Robert, Esq. 5, *Clifton-place, Sussex-square, W.*
1863		*Burns, John, Esq. 1, *Park-gardens, Glasgow; and Castle Wemyss, by Greenock, N.B.*
1861		*Burr, Higford, Esq. 23, *Eaton-place, S.W.; and Aldermanston-court, Berkshire.*
1857		Burstal, Capt. E., R.N. 6, *Park-villas, Lower Norwood, S.*

Year of Election.	
1830	*Burton, Alfred, Esq. 36, *Marina, St. Leonard's.*
1833	*Burton, Decimus, Esq., F.R.S. 6, *Spring-gardens, S. W.; and St. Leonard's-cottage, Hastings.*
1859	*Burton, Capt. Richd. Fras., 18th Regt. Bombay N.I., H.B.M. Consul. 14, *St. James's-square, S. W.*
1847	Burton, S. S., Esq. *Churchill-house, Daventry.*
1858	290 Bury, William Coutts, Viscount, M.P. 48, *Rutland-gate, S. W.*
1861	Bush, Rev. Robert Wheler, M.A. 1 *Milner-square, Islington, N.*
1861	Butler, Charles, Esq. 13, *Sussex-square, W.*
1859	Butler, Edward, Esq. *Lansdowne-road, Hyde-park, W.*
1860	*Butler, Rev. Thomas. *Rector of Langar, Nottinghamshire.*
1862	*Buxton, Chas., Esq., M.P. 7, *Grosvenor-crescent, S. W.; and Fox-warren, Surrey.*
1858	*Buxton, Sir Thomas Fowell, Bart. *Brick-lane, N.E.*
1863	Byron-Moore H., Esq. *Survey Office, Melbourne, Australia.*
1864	Bythesea, Capt. J., R.N., V.C. 20, *Grosvenor-place, Bath.*
1830	*Cabbell, B. B., Esq., M.A., F.R.S., F.S.A. 1, *Brick-court, Temple, E.C.*; 52, *Portland-place, W.; and Aldwick, Sussex.*
1857	300*Caldwell, Capt. Henry, R.N. *H.M.S. 'Mersey,' Portsmouth; and* 3, *Audley-sq., W.*
1863	Callaghan, Thos. F., Esq.
1863	Calthorpe, Lord. 33, *Grosvenor-square, W.*
1861	Calthorpe, the Hon. Augustus Gough. 33, *Grosvenor-square, W.*
1855	*Calthorpe, the Hon. F. H. Gough, M.P. 33, *Grosvenor-square, W.*
1859	Calvert, Edmund, Esq. *British Embassy, Constantinople.*
1854	Calvert, Frederic, Esq., Q.C. 9, *St. James's-place, S. W.; and* 8, *New-square, Lincoln's-inn, W.C.*
1830	*Camden, George Charles, Marquis, K.G., D.C.L., M.A. *Wilderness-park, Sevenoaks, Kent; and Bayham-abbey, Sussex.*
1858	Cameron, Capt. Charles D.
1861	Cameron, Donald, Esq. *Auchnacarry, Invernesshire.*
1864	310 Cameron, J., Esq. *Singapore.*
1858	Cameron, Major-General Duncan Alexander, R.E., C.B. *New Zealand.*
1861	Campbell, Capt. Frederick, R.N. 12, *Connaught-place, Hyde-park, W.*
1844	*Campbell, James, Esq. *Grove-house, Hendon, Middlesex; and* 8, *Park-street, Grosvenor-square, W.*
1857	Campbell, James, Esq., Surg., R.N. *Bangkok, Siam.*
1834	*Campbell, James, Esq., jun. *Hampton-court-green, S. W.*
1863	Campbell, Jas. Duncan, Esq. 8, *Norfolk-terrace, Westbourne-grove, W.*
1857	Camps, William, Esq., M.D. 40, *Park-street, Grosvenor-square, W.*
1857	Cannon, Lieut.-General P.
1853	*Cardwell, Right Hon. Edward, M.P. 74, *Eaton-square, S. W.*
1863	320*Carew, R. R., Esq. 26, *Westbourne-terrace, W.; and Oriental Club, W.*
1862	Cargill, John, Esq. *Dunedin, Otago, New Zealand.*
1863	*Cargill, Wm. W., Esq., M.P. 4, *Connaught-place, Hyde-park, W.*

Year of Election.		
1864		Carmichael, Lieut. L. M. *Lucknow.*
1863		Carnegie, Capt. the Hon. J., R.N.
1864		Carrington, R. C., Esq. *Admiralty, W.*
1861		Carter, Captain Hugh Bonham, Coldstream Guards. *Guards' Club, S.W.; and* 1, *Carlisle-place, Victoria-street, S.W.*
1860		Cartwright, Capt. Henry, F.S.A. 13, *Gloucester-square, Hyde-park, W.*
1857		Cartwright, Col. Henry, Grenadier Guards, M.P. 1, *Tilney-street, Park-street, Grosvenor-square, W.*
1860		*Carver, the Rev. Alfred J., D.D., Master of Dulwich College. *Dulwich, S.*
1858	330	Casella, Louis P., Esq. 23, *Hatton-garden, E.C.; and South-grove, Highgate, N.*
1863		Cator, A. B., Esq. 17, *Sussex-square, Hyde-park, W.*
1860		Cave, Amos, Esq. 109, *New-road, Kennington-park, S.; and Rathbone-pl., Oxford-st., W.*
1857		Cave, Capt. Laurence Trent. 23, *Lowndes-street, Belgrave-square, S.W.*
1858		Cave, Stephen, Esq., M.P. 35, *Wilton-place, S.W.*
1863		Challis, John Henry, Esq. *Reform Club, S.W.*
1858		Champion, John Francis, Esq. *High-street, Shrewsbury.*
1834		*Chapman, Capt. John James, R.A., F.R.S. 33, *Adelaide-square, Bedford.*
1863		Chapman, Spencer, Esq. 47, *Grosvenor-street, W.*
1860		Charlemont, Lord. *Charlemont-house, Dublin.*
1861	340	Charnock, Richard Stephens, Esq. 8, *Gray's-inn-square, W.C.*
1864		Cheadle, Walter, Esq., B.A., M.B. Camb. 8, *Old Cavendish-st., Cavendish-sq. W.*
1861		Cheetham, John Frederick, Esq. *Eastwood, Staleybridge.*
1855		Cheshire, Edward, Esq. *Conservative Club, S.W.*
1838		*Chesney, Major-General Francis Rawdon, R.A., D.C.L., F.R.S. *Athenæum Club, S.W.; and Ballyardle, Down, Ireland.*
1858		Chetwode, Augustus L., Esq. 7, *Suffolk-street, Pall-mall-east, S.W.; and Chilton-house, Thame, Oxfordshire.*
1858		Childers, Hugh C. E., Esq., M.P. 17, *Prince's-gardens, W.; and Australia.*
1856		Childers, John Walbanke, Esq. *Cantley-hall, near Doncaster.*
1857		*Chimmo, Commr. William, R.N. *Regent-st., Glasgow.*
1861		Christian, Capt. Henry, R.N. *Commr. of the Royal Yacht, Portsmouth.*
1854	350	Christy, Henry, Esq. 103, *Victoria-street, S.W.; and Woodbines, near Kingston, Surrey, S.W.*
1854		*Church, J. W., Esq., B.A. *United University Club, S.W.; and Woodside, Hatfield.*
1830		*Church, W. H., Esq.
1849		Churchill, Lord Alfred Spencer, M.P. 16, *Rutland-gate, S.W.*
1856		Churchill, Charles, Esq. 29, *Sussex-square, Hyde-park, W.*
1853		Clarendon, George William, Earl of, K.G., G.C.B. 1, *Grosvenor-crescent, S.W. The Grove, Watford, Herts; and Hindon, Wilts.*
1863		Clark, Lieut. Alex. J. 14, *St. James's Square, S.W.; and Eveswell-house, Maindee, Newport, Monmouthshire.*
1852		Clark, Daniel, Esq. *Care of J. Littles, Esq., Millbank, near Devonport.*
1840		*Clark, Sir James, Bart., M.D., F.R.S. *Bagshot-park, Surrey.*
1862		Clark, Latimer, Esq. 1, *Victoria-street, Westminster, S.W.; and Cairo.*

Year of Election.	
1851	360 Clark, Rev. Samuel, M.A. *The Vicarage, Bredwardine.*
1859	Clarke, Capt. A., R.E. *Army and Navy Club, S.W.*
1860	Clarke, Rev. Joseph W., B.D., Chaplain R.N. *H.M.S. 'Hawke.'*
1855	*Clarke, Rev. W. B., M.A. *St. Leonard's, Sydney, New South Wales.*
1859	Clarke, Rev. W. Geo., M.A. *Trinity College, Cambridge.*
1862	Claude, Eugène, Esq. 22, *Park-road, Holloway, N.*
1842	*Clavering, Sir William Aloysius, Bart., M.A. *United University Club, S. W.; Axwell-park, near Gateshead; and Greencroft, Durham.*
1863	Clay, Sir Wm., Bart. *Eaton-square, S.W.*
1863	Clayton, Capt. John W., late 15th Hussars. 14, *Portman-square, W.*
1863	Clements, Rev. H. G. *United University Club, S.W.*
1860	370 Clerk, Capt. Claude. *Military Prison (Queen's Bench) Southwark, S.*
1830	*Clerk, Rt. Hon. Sir George, Bart., D.C.L., F.R.S., &c. *Pennicuik-house, Edinburgh.*
1858	Clermont, Thomas, Lord. *Ravensdale-park, Newry, Ireland.*
1861	Clifford, Sir Charles. *Coldham-hall, Suffolk.*
1858	Clifford, Charles Cavendish, Esq., M.P. *House of Lords, S.W.*
1856	Clive, Rev. Archer. *Whitfield, Hereford.*
1863	Clowes, E., Esq. *Reform Club*, 105, *Pall-mall, S.W.*
1854	Clowes, George, Esq. *Duke-street, Stamford-street, Blackfriars, S.; and Surbiton, Surrey.*
1864	Clowes, Rev. George, B.A. *Surbiton, Surrey.*
1854	Clowes, William, Esq. 51, *Gloucester-terrace, Hyde-park, W.*
1861	380 Clowes, William Charles Knight, Esq. *Duke-street, Stamford-street, Blackfriars, S.; and Surbiton, Surrey.*
1852	Cobbold, John Chevalier, Esq., M.P. *Athenæum Club, S.W.; and Ipswich, Suffolk.*
1859	Cochrane, Capt. the Hon. A., R.N., C.B. *Junior United Service Club, S.W.*
1862	Cockerton, Richard, Esq. 12, *Petersham-terrace, South Kensington, W.*
1862	*Cockle, George, Esq. 77, *Onslow-square, S.W.*
1859	Cocks, Colonel C. Lygon, Coldstream Guards. *Treverbyn-Vean, near Liskeard.*
1841	*Cocks, Reginald Thistlethwayte, Esq. 43, *Charing-cross, S.W.; and* 22, *Hertford-street, May-fair, W.*
1857	Coghlan, Edward, Esq. *Training Institution, Gray's-inn-road, W.C.*
1862	Coghlan, Gen. William M., R.A. Commandant and Political Agent, *Aden; and Ramsgate, Kent.*
1861	Coghlan, J., Esq., Engr.-in-Chief to the Government. *Buenos Ayres.*
1838	390 Colchester, Charles, Lord, Rear-Admiral, D.C.L. 34, *Berkeley-square, W. and Kidbrooke, Sussex.*
1853	Cole, John Griffith, Esq., M.A., M.R.I. 8, *Charles-street, Berkeley-square, W.*
1841	*Colebrooke, Sir Thomas Edward, Bart., M.P., F.R.A.S. 37, *South-st., Park-lane, W.*
1834	Colebrooke, Lt.-General Sir Wm., R.A., M.G., C.B., K.H., F.R.A.S. *Datchet near Windsor; and United Service Club, S.W.*
1854	Coleman, Everard Home, Esq., F.R.A.S. *Registry and Record Office, Adelaide-place, London-bridge, E.C.*
1848	Coles, Charles, jun., Esq. 86, *Great Tower-street, E.C.*
1835	*Collett, William Rickford, Esq.

Year of Election.		
1858		Collinson, Henry, Esq. 8, *St. James's-terrace, Paddington, W.*
1855		Collinson, Rear-Admiral Richard, C.B. *Haven-lodge, Ealing, W.; and United Service Club, S.W.*
1864		Colnaghi, Dominic E., Esq. 15, *Warwick-street, Spring-gardens, S.W.*
1861	400	*Colville, Charles John, Lord. 42, *Eaton-place, S.W.*
1861		Combe, Thomas, Esq., M.A. *University Press, Oxford.*
1864		Commerell, Commr. J. E., R.N., V.C. *Alverbank, near Gosport.*
1864		Conder, John, Esq. *Hallbrooke-house, New Wandsworth, N.W.*
1861		Constable, Capt. Chas. Golding, I.N. 68, *Hamilton-ter., St. John's-wood, N.W.*
1843		*Cook, James, Esq. 40, *Mincing-lane, E.C.; and* 47, *Portland-place, W.*
1859		Cooke, Major A. C., R.E. *Topographical Department,* 4, *New-street, Spring-gardens, S.W.*
1863		*Cooke, E. W., Esq., A.R.A., F.R.S., F.L.S., F.G.S. *The Ferns, Kensington, W.*
1860		Cooke, George Wingrove, Esq., Barrister-at-Law. 2, *Brick-court, Temple, E.C.; and* 25, *Cheyne-walk, Chelsea, S.W.*
1856		Cooke, John George, Esq. 47, *Mount-street, Berkeley-square, W.*
1860	410	Cooke, Nathaniel, Esq. 5, *Ladbrooke-terrace, Notting-hill, W.*
1852		Cooke, Robt. F., Esq. 50, *Albemarle-street, W.; and* 38, *Nottingham-place, New-road, W.*
1860		Cooke, William Henry, Esq., Barrister-at-Law. 4, *Elm-court, Temple, E.C.*
1830		Cooley, William Desborough, Esq. 20, *New Milman-st., Guildford-st., W.C.*
1862		Cooper, Sir Daniel. 20, *Prince's-gate, S.W.*
1856		Cooper, Lt.-Col. Edward, Grenadier Guards. 36, *Hertford-street, W.*
1860		Cooper, Major Joshua H., 7th Fusiliers. *Gibraltar.*
1853		Coote, Charles Chidley, Esq. C 4, *Albany, W.; and Mount-Coote, Limerick, Ireland.*
1857		*Coote, Captain Robert, R.N. *The Cottage, Pinner.*
1862		Cope, Walter, late H.M.'s Chargé d'Affaires at the Equador. 14, *The Terrace, Camberwell, S.*
1853	420	Copley, Sir Joseph William, Bart. *Sprotborough, Doncaster.*
1863		Corbet, Richard, Esq. 41, *Portman-square, W.; and Adderley-hall, Shropshire.*
1864		Cork and Orrery, Earl of. 1, *Grafton-street, W.*
1860		Cornwell, James, Esq., PH. DR. *Loughborough-park-villa, Brixton, S.*
1839		*Corrance, Frederick, Esq. *Parkham-hall, Wickham Market, Suffolk.*
1856		Costerton, John C., Esq. *Canton.*
1853		*Cosway, William Halliday, Esq. *Oxford and Cambridge Club, S.W.*
1863		Courtenay, L. W., Esq. 58, *Threadneedle-street, E.C.*
1865		Cowan, John E., Esq. 27, *Prince's-square, Hyde-park, W.*
1862		Coward, William, Esq. 5, *Park-villas, Lower Norwood, S.*
1857	430	*Cowell, Major J. C., R.E. *Buckingham-palace, S.W.*
1861		Cowell, John Jermyn, Esq. 41, *Gloucester-terrace, Hyde-park, W.*
1854		Cowley, Norman, Esq. 4, *Montagu-place, Montagu-square, W.*
1862		Cowper, Sedgwick S., Esq. *Messrs. J. Clinch and Son, Abchurch-lane, E.C.*
1862		Cox, Edward William, Esq., Barrister-at-Law, Recorder of Falmouth. 1, *Essex court, Temple, E.C.; and Moat-mount, Highwood, Middlesex.*

Year of Election.		
1853		*Cracroft, Captain Peter, R.N., C.B. *H.M.S. 'Niger,' Australia.*
1858		Cranbourne, James, Viscount. 20, *Arlington-street, S.W.*
1853		Craufurd, Captain Frederic A. B., R.N. *United Service Club, S.W.; and H.M.S. 'Egmont,' Rio.*
1857		Craufurd, Major-General James Robertson, Grenadier Guards. *Travellers' Club, S.W.; and Sunning-hill, Chertsey.*
1857		Crawford, James, Esq. *Brussa, Turkey.*
1848	440	Crawford, Robert Wigram, Esq., M.P. 71, *Old Broad-street, E.C.*
1830		Crawfurd, John, Esq., F.R.S. *Athenæum Club, S.W.; and* 4, *Elvaston-place, Queen's-gate, S.W.*
1861		Creswell, Rev. S. F., M.A. *The Grammar School, Lancaster.*
1854		*Creswell, Captain S. Gurney, R.N. *Lynn, Norfolk.*
1856		Croker, T. F. Dillon, Esq. 19, *Pelham-place, Brompton, S.W.*
1864		Croll, A. A., Esq., C.E. 20, *Sussex-place, Regent's-park, N.W.*
1860		*Croskey, J. Rodney, Esq. 84, *King William-street, E.C.; and Warwick-house, Warwick-road, Paddington, W.*
1860		Crosse, the Rev. Thomas, D.C.L., M.R.A.S. *Hastings.*
1862		Crossman, James Hiscutt, Esq. 24, *Norfolk-crescent, Hyde-park, W.*
1863		Crowder, Thos. Moseley, Esq., M.A. *Thornton-hall, Bedale, Yorkshire.*
1852	450	Crowdy, James, Esq. 17, *Serjeants'-inn, E.C.*
1861		Crowley, Jonathan Sparrow, Esq., C.E. *Lavender-hill, Battersea, S.W.*
1861		Cruikshank, David, Esq. *Avenue-place, Southampton.*
1859		Cull, Richard, Esq., F.S.A. 13, *Tavistock-street, Bedford-square, W.C.*
1863		Cumming, Sir Alex. G. *Altyre, Forres, N.B.*
1857		Cumming, William Fullarton, Esq., M.D. *Athenæum Club, S.W.; and Athol-crescent, Edinburgh.*
1847		*Cunard, Edward, Esq. 26, *Prince's-gardens, South Kensington, W.*
1846		Cunard, Sir Samuel, Bart. 26, *Prince's-gardens, South Kensington, W.*
1860		Cunliffe, Roger, Esq. 24, *Lombard-street, E.C.; and* 10, *Queen's-gate, South Kensington, W.*
1864		Cunningham, H. Esq. *Craven-hill, W.*
1853	460	Cunningham, John Wm., Esq., Sec. King's College. *Somerset-house, W.C.; and Harrow, N.W.*
1862		*Cunynghame, Major-Gen. A. T., C.B. *Commanding Scind Division, Bombay.*
1865		Cure, Capel, Esq. 51, *Grosvenor-street, W.*
1843		*Cursetjee, Manockjee, Esq., F.R.S.N.A. *Villa-Byculla, Bombay.*
1839		*Curtis, Timothy, Esq.
1863		*Dalgety, Fred. G., Esq. 8, *Hyde-park-terrace, W.*
1863		Dalrymple, Donald, Esq. *Norwich.*
1861		Dalrymple, F. Elphinstone, Esq., India Civil Service. *Albemarle-hotel, Albemarle-street, W.*
1857		Dalton, D. Foster Grant, Esq. *Shanks-house, near Wincanton, Somerset.*
1859		Dalyell, Sir Robt. Alex. Osborn, Bart. *H.M.'s Consul at Jassy; and Royal Hospital, Greenwich, S.E.*

Year of Election.	
1851	470 *Daniell, Wm. Freeman, Esq., M.D., F.L.S. *Junior U. S. Club, S.W.; and 17, Charles-street, St. James's, S. W.*
1862	Darvall, John Bayly, Esq. 6, *Onslow-square, S.W.*
1838	*Darwin, Charles, Esq., M.A., F.R.S. *Athenæum Club, S.W.; and Down, near Bromley, Kent.*
1860	Dasent, John Bury, Esq. 22, *Warwick-road, Maida-hill, W.*
1863	Davies, R. H., Esq. 2, *Berkeley-street, Berkeley-square, W.*
1858	Davies, William, Esq. *West Indies.*
1858	Davis, Dr. Francis William, Surgeon R.N. *H.M.S. 'Spiteful;' and Lurganboy-house, Manor Hamilton, Ireland.*
1861	Davis, Staff-Commander John Edward, R.N. *Hydrographic-office, Admiralty, S. W.*
1846	Davis, Sir John Francis, Bart., K.C.B., F.R.S., F.R.S.N.A. *Athenæum Club, S. W.; and Hollywood, near Bristol.*
1840	*Dawnay, the Hon. Payan. *Beningborough-hall, Newton-upon-Ouse, Yorkshire.*
1859	480 De Blaquiere, John, Lord. 9, *Stratford-place, W.*
1852	De Boinville, Chev. Alexander, K.L.H. 25, *Newland-street, Kensington, W.*
1858	De Bourgho, T. J., Esq. 6, *Charing-cross, S.W.*
1856	De Crespigny, Lieut. C., R.N.
1856	De Gex, William Francis, Esq. 25, *Throgmorton-street, E.C.*
1853	De Grey and Ripon, George Frederick Samuel, Earl. 1, *Carlton-gardens, S.W.; and Studley Royal, Ripon.*
1862	Denham, Capt. Henry Mangles, R.N., C.B. 16, *Delamere-terrace, W.*
1860	Denison, Alfred, Esq. 6, *Albemarle-street, W.*
1834	*Denison, His Excellency Sir William Thomas, Lieut.-Col. R.E., F.R.S. *Governor of Madras.*
1836	Denman, Rear-Admiral the Hon. Joseph. *Commander-in-Chief, Pacific; and 17, Eaton-terrace, S. W.*
1833	490 *Derby, Edward Geoffrey, Earl of, P.C., F.L.S. 23, *St. James's-square, S. W.; and Knowsley-park, Prescott, Lancashire.*
1854	*Devaux, Alexander, Esq. 2, *Avenue-road, Regent's-park, N.W.*
1860	Devine, Thomas, Esq., Chief of Surveys. *Quebec, Upper Canada.*
1837	*Devonshire, William Cavendish, Duke of, LL.D., D.C.L., M.A., F.R.S. *Devonshire-house, Piccadilly, W.; and Hardwicke-hall, Derbyshire.*
1864	Dick, A. H. Esq., M.A., *Roseland-house, Partrick, near Glasgow.*
1862	Dick, Capt. Charles Cramond. *Exeter, Devon.*
1863	Dick, J. N., Esq., R.N. 2, *Clifton-gardens, Maida-hill, W.*
1861	Dick, Robert Kerr, Esq., Bengal Civil Service. *Oriental Club, W.*
1833	Dickenson, John, Esq., F.R.S., F.S.A. 39, *Upper Brook-street, W.; and Abbott's-hill, Hemel-Hempstead.*
1852	Dickenson, John, Esq., jun. *Clarence-chambers,* 12, *Haymarket, S. W.; and Abbott's-hill, Hemel-Hempstead.*
1854	500 *Dickenson, Sebastian Stewart, Esq., Barrister-at-Law. *Brown's-hill, Stroud, Gloucestershire.*
1860	Dickinson, Rev. C. S. Allen, B.A.
1830	*Dickinson, Francis Henry, Esq., F.S.A. 8, *Upper Harley-street, W.; and Kingweston-park, Somerset.*

Year of Election.		
1860		Dickinson, Jas. Austen, Esq. *County Surveyor's Office, Mullingar.*
1859		Dickson, A. Benson, Esq. *Chapel-stairs, Lincoln's-inn, W.C.*
1858		Dickson, Charles Hanmer, Esq. *H.B.M. Consul, Sûkum Kalé, Black Sea.*
1860		Dickson, Lieut.-Col. Lothian Sheffield. 10, *Stanhope-terrace, Hyde-park, W.*
1843		Dickson, Peter, Esq. 28, *Upper Brook-street, W.*
1860		Dietz, Bernard, Esq., of Algoa Bay. 3, *Dorset-square, W.*
1859		Digby, G. Wingfield, Esq. 35, *Brook-street, Grosvenor-square, W.; and Sherborne-castle, Dorset.*
1860	510	Digby, Lieut.-Col. John Almerus. *Chalmington-house, Cattstock, Dorchester.*
1845		*Dilke, Sir Charles Wentworth, Bart. 76, *Sloane-street, S.W.*
1859		*Dilke, Charles Wentworth, Esq. 76, *Sloane-street, S.W.*
1856		Dillon, the Hon. Arthur. 17, *Clarges-street, W.*
1865		*Dillon, John, Esq. *Netley-Lodge,* 31, *Phillimore-gardens, Kensington, W.*
1864		Dimsdale, J. C., Esq. 50, *Cornhill, E.C.; and* 52, *Cleveland-square, S.W.*
1861		Dixon, Lieut.-Colonel John. 4, *Craig's-court, S.W.*
1854		Dixon, W. Hepworth, Esq., F.S.A. *Essex-villa, Queen's-road, St. John's-wood, N.W.*
1857		Dobie, John, Esq., R.N. *Junior United Service Club, S.W.; and Club-chambers, S.W.*
1857		Dobie, Robert, Esq., M.D., R.N. 7, *Houghton-pl., Ampthill-sq., Hampstead-rd., N.W.*
1854	520	Dodson, John George, Esq., M.P. 6, *Seamore-place, Mayfair, W.*
1862		Dolben, Commr. Wm. Digby Mackworth, R.N. *H.M.S. 'Bloodhound,' W. Coast of Africa.*
1854		*Dollond, George, Esq. *St. Paul's-churchyard, E.C.*
1854		Domville, William T., Esq., M.D., R.N. *Army and Navy Club, S.W.*
1853		Donaldson, Sir Stuart A. 32, *Prince's-gardens, W.; and Sydney, Australia.*
1858		Donne, John, Esq. *Instow, North Devon.*
1861		Donoughmore, R. J. Hely-Hutchinson, Earl of. 52, *South Audley-street, W.; Knocklofty-house, Tipperary; and Palmerston-house, near Dublin.*
1864		Doran, Dr. John, F.S.A. *Royal-crescent, Notting-hill, W.*
1850		Dover, John William, Esq. 124, *Fenchurch-street, E.C.*
1854		Dower, John, Esq. 108, *Fleet-street, E.C.*
1853	530	Doyle, Sir Francis Hastings C., Bart. *Custom-house, E.C.*
1845		*Drach, Solomon Moses, Esq., F.R.A.S. 39, *Howland-street, Fitzroy-square, W.*
1864		Drew, Major H. 14, *St. James's-square, S.W.*
1865		Drummond, E. A., Esq. 1, *Montague-square, W.*
1846		Drummond, Lieut.-General John. *The Boyce, Dymock, Gloucestershire.*
1846		Drury, Capt. Byron, R.N. *The Thicket, Southsea.*
1857		Dublin, His Grace the Archbishop of. *Dublin.*
1851		*Du Cane, Major Francis, R.E. 64, *Lowndes-square, S.W.*
1851		*Ducie, Henry John, Earl, F.R.S. 30, *Prince's-gate, S.W.*
1859		Ducket, Clark A., Esq., M.D., Surg. R.N. *H.M.S. 'Geyser;' and* 5, *Sefton-terrace, Great Yarmouth.*
1859	540	Duckworth, Henry, Esq. 2, *Gambier-terrace, Liverpool.*
1860		*Duff, Mountstuart Elphinstone Grant, Esq., M.P. 4, *Queen's-gate-gardens, S. Kensington, W.*

Year of Election.

1865 *Dufferin, Right Hon. Lord. *Dufferin-lodge, Fitzroy-park, Highgate, N.*

1864 Duke, Sir James, Bart. 43, *Portland-place, W.; and Laughton-lodge, Sussex.*

1863 Duncan, Lieut. Francis, B.A., M.A., F.R.S. *Woolwich, S.E.*

1861 *Duncan, George, Esq. 45, *Gordon-square, W.C.*

1840 *Dundas, Right Hon. Sir David, Q.C. 13, *King's-Bench-walk, Temple, E.C.; and Ochtertyre, Stirling.*

1860 Dunell, Henry James, Esq. 4, *Upper Hyde-park-gardens, W.*

1859 *Dunlop, R. H. Wallace, Esq., C.B., Indian Civil Service. *Messrs. Grindlay and Co., Parliament-street.*

1860 *Dunmore, Charles Adolphus Murray, Earl of. 24, *Carlton-house-terrace, S.W.*

1837 550 *Dunraven, Edwin Richard, Earl of, F.R.S. *Adare-manor, Limerick; and Dunraven-castle, Glamorganshire.*

1856 Duprat, Chevalier Alfredo. *H.M.F. Arbitrator, Cape Town, Cape of Good Hope; and 4, Vicarage-gardens, Campden-hill, W.*

1861 Duprée, Thos. W., Esq., M.D. *Panama.*

1852 D'Urban, Colonel W. J. *Deputy Quartermaster-General, Canada; U. S. Club, S.W.; and Newport, near Exeter.*

1861 Dyke, Commander Peché H., R.N. 3, *Southwick-place, Hyde-park, W.*

1857 Eardley, Sir E. G. Culling. *Belvedere, Erith.*

1854 Eardley-Wilmot, Capt. A. P., R.N., C.B. *H.M.S. 'Nile,' Queenstown.*

1856 Eardley-Wilmot, Col. F., M.R.A. *Shoebury Ness, Essex.*

1857 Eastwick, Captain W. J. 12, *Leinster-terrace, Hyde-park, W.*

1863 Eaton, F. A., Esq. *New University Club, St. James's-street.*

1862 560 *Eaton, H., Esq.

1862 *Eaton, Henry William, Esq. 16, *Prince's-gate, Hyde-park, W.*

1864 *Eaton, William Meriton, Esq., 16, *Prince's-gate, Hyde-park, W*

1861 Eber, General F. 33, *St. James's-square, S.W.*

1862 Ebury, Lord. 107, *Park-street, Grosvenor-square, W.; and Moor-park, Herts.*

1862 Eden, Rear-Adm. Charles, C.B. *Admiralty, S.W.; and 20, Wilton-place, S.W.*

1858 Edge, Rev. W. J., M.A. *Benenden-vicarage, near Staplehurst, Kent.*

1863 Edgeworth, M. P., Esq., BENG.C.S. *Mastrim-house, Anerly, S.*

1861 *Edwards, Henry, Esq. 53, *Berkeley-square, W.*

1860 Edwards, Major James B., R.E. *Junior United Service Club, S.W.*

1860 Egerton, Colonel the Hon. Arthur. 13, *Upper Belgrave-street, S.W.*

1857 570 Egerton, Commander Charles Randell, R.N. 7, *Rutland-gate, S.W.*

1853 Egerton, Captain the Hon. Francis, R.N. *Bridgewater-house, S.W.; and H.M.S. 'St. George.'*

1863 *Elder, George, Esq. *Knock-castle, Ayrshire.*

1860 Elderton, Edward M., Esq. 40, *St. George's-road, Pimlico, S.W.*

1862 Elkington, Lieut.-Col. J. H. F. *Army and Navy Club, S.W., and Park-street, Bath.*

1845 Ellenborough, Edward, Earl of, G.C.B. 110, *Eaton-square, S.W.; and Southam-house, near Cheltenham.*

Year of Election.	
1863	Ellerton, John L., Esq. 6, *Connaught-place, Hyde-park W.*
1860	Elliot, George, Esq., C.E. *The Hall, Houghton-le-Spring, near Fence Houses, Durham.*
1857	*Elliot, Capt. L. R. *La Mailleraye-sur-Seine, Seine Inférieure.*
1830	580*Elliott, Rev. Charles Boileau, M.A., F.R.S. *Tattingstone, Suffolk.*
1861	Ellis, Rev. William. *Madagascar.*
1858	Elphinstone, Major Howard C., R.E. *Buckingham-palace, S. W.*
1857	Elton, Sir Arthur H., Bart. *Athenæum Club, S. W.; and Clevedon-court, Somersetshire.*
1862	*Emanuel, Harry, Esq. 8, *Clarence-terrace, Regent's-park, N. W.*
1863	Emslie, John, Esq. 47, *Gray's-inn-road, W.C.*
1830	Enderby, Charles, Esq., F.R.S., F.L.S. 13, *Great St. Helen's, E.C.*
1860	Enfield, Edward, Esq., F.S.A. 19, *Chester-terrace, Regent's-park, N. W.*
1863	Engleheart, Gardner D., Esq. 1, *Eaton-place-south, S. W.*
1856	Entwisle, John, Esq. 1, *Russell-square, W.C.*
1861	590 Erroll, William Harry Hay, Earl of. 3, *Grafton-street, W.; Pembroke-lodge, Richmond-park, S. W.; and Staines-castle, Aberdeenshire.*
1863	*Erskine, Henry David, Esq. *Travellers' Club, S. W.; and* 108, *Gloucester-place, Portman-square, W.*
1852	Erskine, Rear-Admiral John Elphinstone, C.B. *H.M.S. 'Edgar;'* 1 *L, Albany, W., and Cardross, Stirling, N. B.*
1857	*Esmeade, G. M. M., Esq. 29, *Park-street, Grosvenor-square, W.*
1850	Espinasse, Major J. W., 12th Regt.
1851	Evans, Rev. Charles. *King Edward VI. Grammar School, Birmingham.*
1857	Evans, F. J., Esq., Staff Commander, R.N., F.R.S., F.R.A.S. 4, *Wellington-terrace, Charlton, Blackheath, S.E.*
1830	*Evans, Rear-Admiral George. 1, *New-street, Spring-gardens, S. W.; and Englefield-green, Chertsey.*
1857	Evans, Thos. Wm., Esq., M.P. 1, *Dartmouth-street, Westminster, S. W.; and Allestree-wall, Derby.*
1830	*Evans, W. Esq.
1861	600 Evelyn, Lt.-Colonel George P. 4, *Onslow-crescent, S. W.*
1851	*Evelyn, William J., Esq., F.S.A. *Evelyn Estate Office, Evelyn-street, Deptford.*
1845	*Everest, Sir Geo., Bengal Art., K.C.B., F.R.S., &c. 10, *Westbourne-street, Hyde-park, W.*
1830	*Everett, James, Esq., F.S.A.
1859	Ewart, William, Esq., M.P. 6, *Cambridge-square, W.*
1856	Ewing, J. D. Crum, Esq. 21, *Birchin-lane, E.C.*
1857	Eyre, Edward J., Esq., Lt.-Gov. of Antigua.
1861	Eyre, George E., Esq. 59, *Lowndes-square, S. W.*
1856	Eyre, M.-Gen. Vincent, C.B. *Athenæum Club, S. W.; and* 60, *Cambridge-terrace, Hyde-park, W.*
1861	Fairbairn, William, Esq., C.E., F.R.S. *Manchester.*

Year of Election.		
1856	610	Fairholme, George Knight, Esq. *Union Club, S.W.; and Ravenswood, Melrose, N.B.*
1838		Falconer, Thomas, Esq. *Usk, Monmouthshire.*
1857		Falkland, Lucius Bentinck, Viscount. *Skutterskelfe, Yorkshire.*
1855		*Fanshawe, Admiral E. G. 63, *Eaton-square, S.W.*
1863		*Farrer, W. Jas., Esq. 24, *Bolton-street, Piccadilly, W.*
1864		Faulkner, Charles, Esq. *Deddington, Oxford.*
1863		*Faunthorpe, J. P., Esq. *Training College, Battersea.*
1853		*Fayrer, Joseph, Esq., M.D. *Calcutta.*
1858		Fazakerley, J. N., Esq. 17, *Montagu-street, Portman-square, W.*
1864		Ferguson, J., Esq. *Western Club, Glasgow.*
1856	620	Ferguson, William, Esq. 2, *St. Aidan's-terrace, Birkenhead.*
1863		Fergusson, Alex., Esq. *Champion-hill, Camberwell, S.*
1840		*Fergusson, James, Esq., F.R.A.S. 20, *Langham-place, W.*
1860		Ferro, Don Ramon de Silva, Chilian Consul General. 43, *Moorgate-street, E.C.*
1830		Findlay, Alexander, Esq. *Hayes, Kent, S.E.*
1844		Findlay, Alex. George, Esq. 53, *Fleet-street, E.C.; and Hayes, Kent, S.E.*
1862		Finnis, Thomas Quested, Esq., Alderman. *Wanstead, Essex, N.E.*
1859		Fisher, Anthony L., Esq., M.D. 14, *York-place, Baker-street, Portman-square, W.*
1863		Fisher, John, Esq. 60, *St. James's-street, S.W.*
1859		Fisher, Robert, Esq. 15, *George-street, Hanover-square, W.*
1857	630	*Fitzclarence, Lieut. the Hon. George, R.N. *Albany-chambers, W.*
1863		Fitzgerald, J. F. V., Esq. 11, *Chester-square, S.W.*
1861		Fitzgerald, Captain Keane. 2, *Portland-place, W.*
1860		Fitzmaurice, Lieut. the Hon. Frederick.
1864		Fitz-Patrick, Lieut. Francis Skelton, 42nd Regt. Madras Army. 7, *Richmond-terrace, Westbourne-grove, W.*
1859		*Fitz-Roy, George Henry, Esq. 6, *Charles-street, Berkeley-square.*
1830		Fitz-Roy, Vice-Admiral Robert, F.R.S. *Board of Trade, S.W.; Athenæum Club, S.W.; and* 38, *Onslow-sq., Brompton, S.W.*
1857		Fitzwilliam, the Hon. C. W., M.P. 60, *St. James's-street, S.W.*
1837		*Fitzwilliam, William Thomas, Earl. 4, *Grosvenor-square, W.; and Wentworth-house, Rotherham, Yorkshire.*
1863		Fleming, G., Esq. *South Camp, Aldershot.*
1861	640	*Fleming, John, Esq. 7, *Mincing-lane, E.C.*
1853		*Flemyng, Rev. Francis P. *Glenfeulan, near Helensburgh, Glasgow.*
1862		Fletcher, John Charles, Esq. *Dale-park, Arundel; and Eaton-place, S.W.*
1857		Fletcher, Thomas Keddey, Esq. *Union-dock, Limehouse, E.*
1864		Flower, Capt. L. 19, *Gt. George-street, S.W.; Banstead, Surrey; and Queen's United Service Club.*
1863		Foley, Col. the Hon. St. George, C.B. *Albany, Piccadilly, W.*
1861		Foord, John Bromley, Esq. 52, *Old Broad-street, E.C.*
1860		Forbes, Commander Charles S., R.N. *Army and Navy Club, S.W.*
1863		Forbes, Lieut. C. J. F. Smith. *Cappoquin, Co. Waterford, Ireland.*
1860		Forbes, the Hon. Horace Courtenay, M.A. *Oriel College, Oxford.*

Year of Election.	
1845	650 Forster, Rev. Charles, B.D. *Stisted-rectory, Essex.*
1839	*Forster, William Edward, Esq. *Burley, near Otley.*
1861	Forsyth, William, Esq., Q.C. 61, *Rutland-gate, S. W.*
1858	Fortescue, Chichester S., Esq., M.P. 7, *Carlton-gardens, S. W.*
1861	*Fortescue, Hon. Dudley F., M.P. 9, *Hertford-street, W.*
1864	Fortuné, C. F., Esq. *Trinidad, West Indies.*
1864	Foster, Capt. W. J. *Stubington-house, Fareham, Hants.*
1864	Foster, H. J., Esq. *Stubington-house, Fareham, Hants.*
1863	Fowler, J. T., Esq. *Government Inspector of Schools, Adyar, Madras, India.*
1850	*Fowler, Robert N., Esq., M.A. 50, *Cornhill, E.C.; and Tottenham, N.*
1861	660 Fox, Arthur Douglas, Esq., C.E. 20, *Clarges-street, Mayfair, W.; and* 8, *New-street, Spring-gardens, S. W.*
1859	Fox, Lieut.-Colonel A. Lane. *Assistant Quartermaster-General, Cork.*
1830	*Fox, Lt.-Gen. C. R. *Travellers' Club, S. W.; and* 1, *Addison-rd., Kensington, W.*
1864	*Fox, F. E. Esq. *Tottenham, Middlesex.*
1860	Fox, Thos., Esq., M.D. *Inspector-General of Hospitals, North Camp, Aldershot.*
1861	Franklin, Joseph Lewis, Esq. 7, *Albemarle-street, W.*
1860	Franks, Charles W., Esq. 5, *John-street, Berkeley-square, W.*
1854	Fraser, Charles, Esq. 54, *Upper Hyde-park-gardens, W.*
1864	Fraser, Com. H. A., I.N.
1860	Fraser, Thos., Esq. *Literary Sec., Hudson Bay Co., Hudson-bay-house, E.C.*
1860	70 Freeman, Daniel Alex., Esq., Barrister-at-law. 1, *Pump-court, Temple, E.C.*
1859	Freeman, H. Stanhope, Esq. *Governor and Commander-in-Chief, Lagos, W. Africa; and* 4, *Royal-crescent, Notting-hill, W.*
1862	Fremantle, Vice-Admiral Sir Charles Howe, K.C.B. 57, *Grosvenor-street, Grosvenor-square, W.*
1863	Fremantle, Commander Edmund Robert, R.N. 4, *Upper Eccleston-street, S. W.*
1856	Fremantle, Rt. Hon. Sir Thomas F., Bart. 4, *Upper Eccleston-street, Belgrave-square, S. W.*
1864	Fremantle, Lieut.-Col. *Guards' Club, S. W.*
1852	French, Dr. James, C.B. *Inspector-General of Hospitals, Graham's Hotel, Edinburgh.*
1850	Frere, Bartle John Laurie, Esq. 45, *Bedford-square, W.C.*
1839	*Frere, George, Esq., jun. *Cape of Good Hope; and* 45, *Bedford-square, W.C.*
1842	Frere, William Edw., Esq., F.R.A.S. *Bombay; and* 45, *Bedford-square, W.C.*
1853	680 Frith, John Griffith, Esq. 13, *Wimpole-street, W.; and* 11, *Austin Friars, E.C.*
1859	Fryer, William, Esq. 39, *Marlborough-hill-gardens, St. John's Wood, N. W.*
1863	Fuidge, William, Esq. 5, *Park-row, Bristol.*
1855	Fuller, John, Esq.
1860	Fussell, Rev. J. G. Curry. 16, *Cadogan-place, S. W.*
1861	Fynes Clinton, Rev. Charles J., M.A. 39, *Bedford-square, W.C.; and Cromwell, Notts.*
1863	*Gabrielli, Antoine, Esq. 6, *Queen's-gate-terrace, Kensington, W.*

Year of Election.		
1858		Gaisford, Thomas, Esq. *Travellers' Club, S.W.*
1861		Gallagher, John, Esq., M.D. *Reform Club, S.W.; and* 109, *Westbourne-terrace, W.*
1855		*Galloway, John James, Esq.
1848	690	*Galton, Capt. Douglas, R.E. 12, *Chester-street, Grosvenor-place, S.W.*
1850		*Galton, Francis, Esq., M.A., F.R.S. 42, *Rutland-gate, S.W.; and* 5, *Bertie-terrace, Leamington.*
1854		*Gammell, Major Andrew. *Drumtochty, Kincardineshire, N.B.*
1859		Gammie, George, Esq. *Shotover-house, Wheatley, Oxon.*
1861		Garden, Robert Jones, Esq. 63, *Montagu-square, W.*
1863		Gardyne, D. J. B. Esq. *Trinity College, Oxford.*
1863		Gascoigne, Frederic, Esq. *Parlington, Yorkshire.*
1859		*Gassiot, John P., Jun., Esq. 6, *Sussex-place, Regent's-park, N.W.*
1838		*Gawler, Colonel George, K.H. *United Service Club, S.W.; and* 4, *Beresford-place, Southsea.*
1859		Gerstenberg, Isidore, Esq. 11, *Warnford-court, Throgmorton-street, E.C.*
1865	700	*Gibbons, John S., Esq., Alderman. 13, *Upper Bedford-place, Russell-sq., W.C.*
1859		*Gibbs, H. Hucks, Esq. *St. Dunstan's, Regent's-park, N.W.*
1857		Gilchrist, John, Esq. 48, *Porchester-terrace, W.*
1855		Gillespie, Alexander, Esq. *Heathfield, Hersham, Esher, Surrey.*
1857		Gillespy, Thomas, Esq. *Brabant-court, Philpot-lane, E.C.*
1863		*Gillett, William, Esq. 6*L, Albany, W.*
1861		Gilliat, Alfred, Esq. *Longham-house, near Wimborne, Dorset.*
1863		Gillies, Robert, Esq., C.E. *Dunnedin, Otago, New Zealand.*
1836		Gladdish, Col. William. *Bycliffes, Gravesend.*
1864		Gladstone, George, Esq. *The Terrace, Clapham-common, S.*
1863	710	Gladstone, J. H., Esq. 28, *Pembridge-gardens, W.*
1862		*Gladstone, Robert Stuart, Esq. 11, *New Broad-street, E.C.*
1846		*Gladstone, William, Esq. 57½, *Old Broad-street, E.C.*
1864		Gladstone, W. K., Esq. *Fitzroy-park, Highgate, N.*
1860		Glascott, Lieut. Adam Giffard, R.N., Acting Commissioner on the Turko-Persian Frontier. *British Embassy, St. Petersburg; and* 4, *Clarence-villas, St. Mary's-grove, Richmond, S.W.*
1857		Gleig, Rev. G. R., M.A. *Chaplain-General, Chelsea-hospital, S.W.*
1854		Glen, Joseph, Esq., Mem. Geogr. Soc. of Bombay. *Oriental Club, W.*
1857		Glover, Lieut. John H., R.N. *Lagos; and Army and Navy Club, S.W.*
1860		Glyn, Capt. H. Carr, R.N. 1, *Eccleston-street, Belgrave-square, S.W.*
1864		Glyn, R. C., Esq. *Army and Navy Club, S.W.*
1864	720	Glyn, Sir Richard. *Army and Navy Club, S.W.*
1862		Goddard, James, jun., Esq. 14, *Mincing-lane, E.C.*
1858		Goldsmid, Frederick D., Esq. 20, *Portman-square, W.*
1863		Goldsmid, Frederick John. *Harrow-on-the-hill; Southborough, Kent; and United Service Club, S.W.*
1861		Goldsmid, Julian, Esq. 20, *Portman-square, W.*
1860		Gooch, Thomas Longridge, Esq. 101, *Inverness-terrace, Bayswater, W.*

Year of Election.		
1864		Goodall, George, Esq.
1863		*Goodenough, Capt. J. G., R.N. *Junior U. S. Club, S.W.*
1864		*Goodenough, Major W., R.A. *Staff-college, Sandhurst, Farnborough Stat., Hants.*
1861		Gooldin, Joseph, Esq. 48, *Upper Hyde-park-gardens, W.*
1856	730	Gordon, Alexander, Esq., C.E. 2, *Vincent-square, Westminster, S.W.*
1856		*Gordon, Colonel the Hon. Alexander H., C.B.
1860		Gordon, the Honourable Arthur.
1858		Gordon, Capt. Charles G., R.E. *Hong-Kong, China.*
1860		Gordon, Rev. Cosmo Reid, M.A., F.S.A. 9, *Greenhill-st., Greenheys, Manchester.*
1854		Gordon, Harry George, Esq. 1, *Clifton-place, Hyde-park-gardens, W.; and Killiechassi, Dunkeld, Perthshire.*
1856		Gordon, Admiral the Honourable John. 28, *Queen Anne-street, W.*
1853		Gordon, Vice-Admiral Robert. *United Service Club, S.W.*
1853		Gore, Montagu, Esq. *Palace-chambers,* 88, *St. James's-street, S.W.*
1853		Gore, Richard Thomas, Esq. 6, *Queen-square, Bath.*
1853	740	Gorman, John, Esq., M.D. 39, *Harewood-square, N.W.*
1859		Gosling, Fred. Solly, Esq. 18, *New-street, Spring-gardens, S.W.*
1862		Goss, Samuel Day, Esq., M.D. 24, *Newington-place, Kennington-park.*
1835		Gould, Lieut.-Colonel Francis A., R.E. *Buntingford, Herts.*
1846		Gould, John, Esq., F.R.S., F.L.S. 26, *Charlotte-street, Bedford-square, W.C.*
1860		Gould, Nathaniel, Esq., F.S.A. 4, *Tavistock-square, W.C.*
1858		Graham, Cyril C., Esq. 9, *Cleveland-row, St. James's, S.W.; and Debroe-house, Watford, Herts.*
1861		Grant, Alexander, Esq. *Oakfield House, Hornsey, N.*
1861		Grant, Daniel, Esq. 11, *Warwick-road, Upper Clapton, N.*
1860		Grant, Capt. James A. *E. India U. S. Club, S.W.; and Dingwall, Rosshire, N.B.*
1861	750	Grant, Colonel W. L., care of Capt. Ellis, *Army and Navy Club, S.W.*
1860		Grantham, Capt. James, R.E. *Scawby, Brigg, Lincolnshire; and Royal Engineer Office, Devonport.*
1830		*Gray, John Edw., Esq., PH.D., F.R.S., Z.S. and L.S. *British Museum, W.C.*
1862		Greathed, Lieut.-Colonel Wilberforce, W. H., C.B. *Horse Guards, Whitehall, S.W.*
1863		Greaves, Rev. Richard W., rector of Tooting. *Tooting, S.*
1861		Green, Capt. Francis. 89, *Eccleston-square, S.W.*
1830		Greene, Thomas, Esq. *Whittington-hall, near Burton, Westmoreland.*
1857		*Greenfield, W. B., Esq. 59, *Porchester-terrace, Hyde-park, W.; and Union Club, S.W.*
1865		Greg, W. R., Esq., Comptroller of H.M.S. Stationery Office. *Wimbledon, S.W.*
1858		Gregory, Charles Hutton, Esq., C.E. 1, *Delahay-street, Westminster, S.W.*
1860	760	*Gregory, Francis Thomas, Esq. *Queensland; and Castle-hill, Wycombe.*
1858		*Gregory, Isaac, Esq. *Chorlton Hall, Victoria-park, Manchester.*
1857		*Grellet, Henry Robert, Esq. *Savage-gardens, Tower-hill, E.C.*
1859		Grenfell, Chas. Pascoe, Esq., M.P. 38, *Belgrave-square, S.W.*
1865		Grenfell, Henry R., Esq., M.P. 45, *St. James's-place, S.W.*

Year of Election.		
1858		Grenfell, Pascoe St. Leger, Esq. *Maesteg-house, Swansea.*
1853		Grenfell, Riversdale W., Esq. 27, *Upper Thames-street, E.C.*
1830		*Greswell, Rev. Richard, M.A., F.R.S. 39, *St. Giles, Oxford.*
1837		*Grey, Sir George, K.C.B. *Governor & Commander-in-Chief, New Zealand.*
1844		*Grey, Ralph Wm., Esq., Commissioner of Customs. 47, *Belgrave-sq., S.W.; and Chipchase-castle, Hexham.*
1864	770	Grierson, Charles, Esq. 60, *St. James's-street, S.W.*
1862		Griffin, James, Esq. *The Hard, Portsea; and Cosham, Hants.*
1861		*Griffith, Daniel Clewin, Esq. 10, *Gower-street, W.C.*
1839		Griffith, John, Esq. 16, *Finsbury-place South, E.C.*
1863		Griffith, Sir Richard. 20, *Eccleston-square, S.W.*
1836		Griffith, Richard Clewin, Esq. 10, *Gower-street, W.C.*
1859		Grimston, the Hon. and Rev. Francis S. *Wakes Colne, Halstead.*
1855		Grindrod, R. B., Esq., M.D., LL.D., F.L.S., &c. *Townsend-house, Malvern.*
1864		Grinnell, C., Esq. *New York.*
1861		Grosvenor, Lord Richard. 33, *Upper Grosvenor-street, W.*
1858	780	Grote, George, Esq. 12, *Savile-row, W.*
1857		Gruneisen, Charles Lewis, Esq. 16, *Surrey-street, Strand, W.C.*
1862		Gunn, F. L. G., Esq., M.D., Army Medical Staff; *Bathurst, Gambia, W. Africa; and* 346, *Bath-crescent, Glasgow.*
1861		Gunnell, Commander Edmund H., R.N. *Army and Navy Club, S.W.;* 21, *Argyll-road, Campden-hill, W.*
1859		*Gurney, John H., Esq., M.P. *Calton-hall, Norwich.*
1857		Gurney, Samuel, Esq., M.P. 25, *Prince's-gate, Hyde-park, S.W.; and Carshalton, Surrey.*
1862		Guthrie, James Alexander, Esq. 30, *Portland-place, W.*
1863		Hadfield, Wm., Esq., Secretary to the Buenos Ayres Railway Company. 11, *Inverness-road, Bayswater, W.*
1863		Hadow, P. D., Esq. *Sudbury-priory, Middlesex.*
1860		Haliday, Lt.-Col. William Robert. *United Service Club, S.W.*
1853	790	*Halkett, Rev. Dunbar S. *Little Bookham, Surrey.*
1853		*Halkett, Lieut. Peter A., R.N. *Windham Club, S.W.*
1861		Hall, Charles Hall, Esq. 54, *Portland-pl., W.; and Watergate, near Emsworth.*
1863		Hall, Henry, Esq. 109, *Victoria-street, S.W.*
1862		Hall, James Tebbutt, Esq. *Fore-street, Limehouse, E.*
1863		Hall, Thomas F., F.C.S. 29, *Warwick-square, S.W.*
1853		Hall, Admiral William Hutcheson, R.N., C.B., F.R.S. *United Service Club, S.W.; and* 48, *Phillimore-gardens, Kensington, W.*
1864		Halliday, Sir Fred., K.C.B. 28, *Cleveland-square, Hyde-park, W.*
1856		Halloran, Alfred L., Esq., Master R.N. 3, *Navy-terr., Torpoint, nr. Devonport.*
1858		Halloran, Arthur B., Esq. *Principal of the South Devon Collegiate School, Heavitree, Exeter.*
1862	800	Hamilton, Archibald, Esq. *South Barrow, Bromley, Kent, S.E.*

Year of Election.		
1861		Hamilton, Lord Claude. 19, *Eaton-sq., S.W.; and Barons-court, Co. Tyrone.*
1830		*Hamilton, Capt. Henry G., R.N. 71, *Eccleston-square, S.W.*
1861		Hamilton, Col. Robert William, Grenadier Guards. 18, *Eccleston-square, S.W.*
1863		Hamilton, R., Esq. *Care of J. Forster Hamilton, Esq.*, 2, *Gloucester-street, Portman-square, W.*
1830		Hamilton, Terrick, Esq. 121, *Park-street, Grosvenor-square, W.*
1846		Hamilton, Rear-Admiral W. A. Baillie. *Macartney-house, Blackheath, S.E.*
1837		Hamilton, Wm. John, Esq., F.R.S. 23, *Chesham-place, S.W.*
1862		*Hanbury, Robert, Esq., M.P. 10, *Upper Grosvenor-street, W.*
1853		*Hand, Captain George S., R.N. *United Service Club, S.W.; and H.M.S. 'Sampson.'*
1860	810	*Handley, Benjamin, Esq., Assistant-Commr. Turko-Persian Frontier. *British Embassy, St. Petersburg; and* 27, *Essex-street, Strand, W.C.*
1861		*Hankey, Blake Alexander, Esq. 38, *Portland-place, W.*
1857		Hankey, Thomson, Esq., M.P. 45, *Portland-place, W.*
1837		*Hanmer, Sir J., Bart., M.P., F.R.S. *Hanmer-hall and Bettisfield-park, Flintshire.*
1859		*Hansard, Henry, Esq. 13, *Great Queen-street, W.C.*
1840		*Harcourt, Egerton V., Esq. *Whitwell-hall, York.*
1864		*Hardie, Gavin, Esq. 113, *Piccadilly, W.*
1864		Harding, Charles, Esq. 43, *Baker-street; and Grafton Club*, 10, *Grafton-street, Piccadilly, W.*
1864		Harding, J. J., Esq. 1, *Barnsbury-park, Islington, N.*
1864		Hardinge, Capt. E., R.N. 32, *Hyde-park-square, W.*
1861	820	Hardinge, Henry, Esq., M.D. 18, *Grafton-street, Bond-street, W.*
1862		Hardman, William, Esq., M.A. *Norbiton-hall, Kingston-on-Thames.*
1864		Hardwicke, B. Esq. 43, *Russell-square, W.C.*
1855		Harris, Archdeacon the Hon. C. A. *Bremhill Vicarage, Chippenham.*
1853		Harris, Capt. the Hon. E. A. J., R.N. *H.B.M.'s Minister Plenipotentiary, Berne.*
1852		Harris, George Frederick, Esq., M.A. *Harrow-park, Middlesex, N.W.*
1859		Harris, Capt. Henry, H.C.S. 35, *Gloucester-terrace, Hyde-park, W.*
1863		Harrison, Chas., Esq. *Lawrie-park, Sydenham; and* 3, *Gt. Tower-st., E.C.*
1859		Harrison, C. H. Rogers, Esq., F.R.C.S. 13, *Lansdowne-road, Clapham-road, S.*
1838		Harrowby, Dudley, Earl of. *Sandon-ho., Lichfield; and Norton, Gloucestershire.*
1863	830	Hart, Percy M., Esq. 5, *Binfield-road, Clapham-road, S.*
1854		*Hartland, Frederick D., Esq., F.S.A., &c. *The Oaklands, near Cheltenham.*
1863		Harvey, Charles, Esq. *Rathgate-cottage, Streatham, S.*
1864		Harvey, John, Esq. *Ickwell Bury, Biggleswade.*
1864		Harvey, John, Esq. 7, *Mincing-lane, E.C.*
1864		Harvey, W. D., Esq. 52, *Notting-hill-square, S.W.*
1846		Harvey, W. S., Esq., R.N. *H.M.S. 'Hannibal,' Mediterranean; and* 14, *Great George-street, S.W.*
1859		Harwood, H. Harwood, Esq. 29, *Cleveland-square, Hyde-park, W.*
1858		Hawker, Edward J., Esq. 37, *Cadogan-place, S.W.*
1834		Hawkins, Francis Bisset, Esq., M.D., F.R.S. 29, *Upper Harley-street, W.; and Leweil-lodge, Dorchester.*

Year of Election.	
1857	840 Hawkins, Capt. Frank K., R.N. *Army and Navy Club, S.W.*
1840	*Hawkins, John, Esq.
1858	*Hawkins, Lieut.-Col. J. Summerfield, R.E. *N.W. American Boundary Commission; and 2, Victoria-street, Westminster, S.W.*
1861	Hawksley, Thomas, Esq., C.E. 14, *Phillimore-gardens, Kensington, S.W.*
1860	Haworth, Frederick, Esq. 9, *Eccleston-street, S.W.*
1852	*Hay, Capt. Sir J. C. Dalrymple, Bart., R.N., M.P. *U.S. Club, S.W.; Dunragit, Glenluce; and Harrow-on-the-hill, N.W.*
1863	*Hay, Lord John.
1859	Hay, Major W. E. *Care of Lady Mary Hay, Linden-lodge, Loan-head, near Edinburgh.*
1864	Haysman, James, Esq. *Burdett-house, Burdett-road, E.*
1862	Head, Alfred, Esq. 13, *Craven-hill-gardens, Bayswater, W.*
1863	850 Headlam, Right Hon. Thos. E., M.P. 27, *Ashley-place, Victoria-street, S.W.*
1859	Heard, G. G. Gilbert, Esq., F.S.A. 18, *Devonshire-terrace, Hyde-park, W.*
1856	Heath, J. Benjamin, Esq., F.R.S., F.S.A., Consul for Sardinia. 31, *Old Jewry, E.C.*
1863	Heathfield, W. E., Esq. 20, *King-street, St. James's, S.W.*
1861	Hector, Alexander, Esq. 6, *Stanley-gardens, Bayswater, W.*
1861	Hector, James, Esq., M.D.
1859	Hellmann, Christian, Esq. *Club-chambers, Regent-street, S.W.*
1859	Hely, Hovendon, Esq. *Australian Club, Sydney.*
1862	Hemans, Geo. Willoughby, Esq., C.E. 13, *Queen's-square, Westminster, S.W.*
1856	Henderson, Andrew, Esq. 102, *Gloucester-place, Portman-square, W.*
1837	860 *Henderson, James, Esq. *Littlewood-park, Forbes, Aberdeenshire.*
1853	Henderson, John, Esq. *Conservative Club, S.W.; and Valparaiso.*
1864	Henderson, R., Esq. *Randal's-park, Leatherhead, Surrey, S.*
1852	Henderson, William, Esq. 5, *Stanhope-street, Hyde-park-gardens, W.*
1844	*Heneage, Edward, Esq. *Stag's-end, Hemel Hempstead.*
1863	Heneage, P. F., Esq. 39, *Charles-street, Berkeley-square, W.*
1861	Henn, Rev. J., B.A., F.G.S., Head Master of the Commercial Schools. *Stratford New-road, Manchester.*
1860	Hennessey, J. B. N., Esq. *1st Asst. Trig. Survey of India, Dehra in the Dhoon, N.W. Provinces, India.*
1862	Henry, Capt. R. J. *Army and Navy Club, S.W.*
1838	*Henry, Wm. Chas., Esq., M.D., F.R.S. *Haffield, near Ledbury, Herefordshire.*
1861	870 *Henty, Douglas, Esq. *Chichester.*
1864	Herbert, George, Esq. *University School, near Nottingham.*
1834	Herbert, Jacob, Esq. *Trinity-house, Tower-hill, E.C.*
1857	Herd, Captain D. J. 2, *Norway-house, Limehouse, E.*
1858	Hertslet, Edward, Esq. *Librarian, Foreign Office, S.W.; and Belle-vue-house Richmond, S.W.*
1841	Hessey, James Augustus, Esq. *Manningford Bruce, Pewsey, Wilts.*
1861	Heugh, John, Esq. *Tonbridge Wells.*
1858	Hewett, Capt. J. A. Napier. *Velindie-house, Trevine, Haverfordwest.*
1856	Hewitt, James, Esq. *Rottingdean, Brighton.*

Year of Election.	
1859	Hewitt, Commander William Nathan Wright, R.N. H.M.S. 'Viper,' W. Coast of Africa.
1840	880 *Heywood, James, Esq., M.P., F.R.S. Athenæum Club, S.W.; and 26, Kensington-palace-gardens, W.
1860	Heyworth, Capt. Lawrence, 4th Royal Lancashire. Jun. United Service Club, S. W.
1853	Hickey, Edwin A., Esq. Beech-hurst, Hayward's-heath.
1856	Hill, Arthur Bowdler, Esq. South-road, Clapham-park, Surrey, S.
1857	Hill, Rev. C. Croft, M.A. Southfield, Clapham-park, Surrey, S.
1854	Hill, Lieut.-Colonel Stephen J. Army and Navy Club, S.W.; and Governor of Antigua.
1861	Hilliard, Major George Towers, Madras Staff Corps. 43, Upper Seymour-street, Portman-square, W.; and India.
1858	Hinchliff, T. Woodbine, Esq., Barrister-at-Law. 64, Lincoln's-inn-fields, W.C.
1859	Hind, Professor Henry Youle, M.A. Toronto, Canada West.
1862	*Hinde, Samuel Henry, Esq. 130, Piccadilly, W.
1846	890 *Hindmarsh, Frederick, Esq. 17, Bucklersbury, E.C.
1861	Hoare, Deane John, Esq. R. T. Y. Club, Albemarle-street, W.
1846	Hobbs, J. S., Esq. 157, Leadenhall-street, E.C.
1855	Hobbs, Wm. Geo. Ed., Esq. Master of Grammar School, Wareside, near Ware.
1830	*Hobhouse, Henry William, Esq. 24, Cadogan-place, S.W.
1861	Hodgins, J. George, Esq., Chief Assist. Depart. of Public Instr. Toronto, Upper Canada.
1834	*Hodgkin, Thomas, Esq., M.D. 35, Bedford-square, W.C.
1856	*Hodgson, Arthur, Esq., Superintendent of the Australian Agricultural Company. Drayton-hall, West Drayton, near Uxbridge.
1861	Hodgson, Christopher Pemberton, Esq.
1861	*Hodgson, James Stewart, Esq. 8, St. Helen's-place, E.C.
1857	900 Hodgson, Kirkman Daniel, Esq., M.P. 8, St. Helen's-place, E.C.
1856	Hogg, James, Esq., Jun. 31, Mecklenburgh-square, W.C.
1830	Hogg, John, Esq., M.A., F.R.S., F.L.S., Foreign Sec. R. Soc. of Literature. 8, Sergeants' Inn, Temple, E.C.; and Norton-house, Stockton-upon-Tees.
1839	*Holford, Robert S., Esq., M.P. Dorchester-house, Park-lane, W.
1830	Holland, Sir Henry, Bart., M.D., F.R.S. 25, Lower Brook-street, W.
1861	Holland, Colonel James. 24, Prince's-square, Kensington-gardens, W.
1863	Holland, Loton, Esq. Swanscoe, near Macclesfield.
1862	Holland, Robert, Esq. Stanmore-hall, Great Stanmore, Middlesex.
1861	*Hollingsworth, John, Esq., M.R.C.S. Bexley-place, Greenwich, S.E.
1861	Holme, J. Wilson, Esq., M.A. Beckenham, Kent, S.E.
1835	910 *Holmes, James, Esq. 4, New Ormond-street, Queen-square, W.C.
1864	Holmes, Capt. R. C. Vine-house, The Mall, Chiswick; and Army and Navy Club, S.W.
1862	Holmes, Sir William H. 4, Southwick-place, Hyde-park, W.
1861	Holms, John, Esq. 9, Petersham-terrace, South Kensington, W.
1839	*Holroyd, Arthur Todd, Esq., M.D., F.L.S. Athenæum Club, S.W.
1857	Holroyd, Henry, Esq., Barrister-at-Law. 2, Elm-court, Temple, E.C.

Year of Election.		
1857		Holt, Vesey, Esq. 63, *Warwick-square, W.*
1864		Homfray, Frederick Samuel, Esq., C.E. 6, *Storey's-gate, S.W.*
1857		Homfray, William Henry, Esq. 6, *Storey's-gate, S.W.*
1874		*Hood, Sir Alex. Acland, Bart., M.P. *St. Andrie's-park, Bridgewater, Somerset.*
1862	920	Hood, Henry Schuback, Esq. *War Office, S.W.; and* 10, *Kensington-park-gardens, W.*
1861		Hood, Thomas Hood, Esq. *Stoneridge, Berwickshire.*
1859		*Hood, William Charles, Esq., M.D. *Bethlehem Hospital, S.*
1830		*Hooker, Sir Wm. J., K.H., PH. D., LL.D., F.R.S., F.S.A., &c. *West-park, Kew, W.*
1861		Hopcraft, George, Esq. 3, *Billiter-square, E.C.*
1846		*Hope, Alex. James Beresford, Esq. *Arklow-house, Connaught-place, Hyde-park, W.; and Bedgebury-park, Hurst-green, Kent.*
1862		Hope, Capt. C. Webley, R.N. *H.M.S. 'Brisk,' Australia; Messrs. Hallett & Co.*
1857		Hoper, Richard, Esq. 53, *Margaret-street, Cavendish-square, W.; and Cowfold Horsham, Sussex.*
1861		Hoskins, Capt. A. H., R.N. *Army and Navy Club, S.W.*
1859		Hoskyns, Chandos Wren, Esq. *Wraxhall-abbey, Warwickshire.*
1853	930	Houghton, Lord, M.P. 16, *Upper-brook-street, W.; The Hall, Bawtry; and Tryston-hall, Ferrybridge, Yorkshire.*
1856		Hovell, William Hilton, Esq. *Goulburn, New South Wales.*
1864		Hovell, W. P., Esq.
1853		Howard, Sir Ralph, Bart. 17, *Belgrave-sq., S.W.; and Bushy-park, Wicklow.*
1857		Howard, Samuel Lloyd, Esq. *Goldings, Laughton, Essex.*
1842		*Hubbard, J. Gellibrand, Esq., M.P. 24, *Prince's-gate, Hyde-park South, W.*
1857		Hughes, Capt. Sir Frederic. *Ely-house, Wexford.*
1838		Hughes, William, Esq. 63, *Oakley-square, St. Pancras, N.W.*
1838		*Hume, Edmund Kent, Esq.
1860		*Hume, Hamilton, Esq. *Cooma Yass, New South Wales.*
1861	940	Hunt, George S. Lennox, Esq., H.B.M. Consul, *Pernambuco.*
1857		Hunt, Zacharias Daniel, Esq. *Aylesbury.*
1862		Hunter, Henry Lannoy, Esq. *Beech-hill, Reading.*
1860		Huskisson, Wm. H. Tilghman, Esq. *Eartham, near Chichester.*
1858		Hutchinson, Thomas J., Esq., F.R.S.L., F.E.S., F.A.S.L., H.B.M. Consul, *Rosario, Argentine Republic.*
1864		Hutchinson, Capt. R. R. *Eltham-cottage, Foxley-road, Brixton.*
1851		Hyde, James Bartlet, Esq. 43, *Priory-road, Kilburn, N.W.*
1860		*Hyde, Captain Samuel. 8, *Billiter-square, E.C.*
1852		Illingworth, Richard Stonhewer, Esq. 9, *Norfolk-crescent, Hyde-park, W.*
1850		*Imray, James Frederick, Esq. 102, *Minories, E.; and Beckenham, Kent, S.E.*
1861	950	*Ingall, Samuel, Esq. 1, *Old Broad-street, E.C.; and Forest-hill, Kent, S.E.*
1860		Ingilby, the Rev. Henry John. *Ripley-castle, Ripley, Yorkshire.*
1851		Inglefield, Captain Edward A., R.N., F.R.S. *United Service Club, S.W.*
1846		Ingram, Hughes Francis, Esq. *University Club, S.W.*

Year of Election.	
1863	Innes, Capt. Alex. 97, *Islington, Liverpool.*
1860	*Inskip, G. H., Esq., Master R.N. *H.M. Surveying Vessel 'Seaflower;' and* 23, *Anne-street, Sunderland.*
1852	*Inskip, Rev. Robert Mills. 8, *Boon's-place, Plymouth.*
1840	*Irby, Frederick W., Esq. *Athenæum Club, S.W.*
1864	*Irving, John, Esq. 8, *Hyde-park-square; and Trinity College, Cambridge.*
1853	Irving, Thomas, Esq. 5, *Belitha-villas West, Barnsbury-park, N.*
1862	960 Irwin, James V. H. 8, *Duke-street, St. James's, S.W.*
1862	Isaac, Frederick N., Esq. *Old Bank, Worcester.*
1864	Ives, W. T., Esq. *St. John's School, Limehouse, E.*
1855	Jackson, William, Esq., M.P. 10, *Mansfield-street, W.*
1862	Jacomb, Thomas, jun., Esq. 23, *Old Broad-street, Gresham-house, E.C.*
1857	James, Colonel Sir Henry, R.E., F.R.S. *Director of the Ordnance Survey, Southampton.*
1861	James, William Bosville, Esq. 13, *Blomfield-road, Maida-hill, W.*
1862	*Jaques, Leonard, Esq. *Easby-abbey, Richmond, Yorks.*
1863	*Jardine, Andrew, Esq. *Lanrick-castle, Stirling.*
1863	*Jardine, Robert, Esq. *Castlemilk, Lockerby, N.B.*
1857	970 Jefferson, Richard, Esq. *Army and Navy Club, S.W.*
1863	Jeffreys, Edw. W. *Conservative Club, S.W.*
1860	*Jejeebhoy, Sir Jamsetjee, Bart. *Bombay.*
1854	Jellicoe, Charles, Esq. 23, *Chester-terrace, N.W.*
1859	Jencken, H. Diedrich, Esq. 1, *Brick-court, Temple, E.C.; and* 2, *York-terrace, Upper Sydenham, S.E.*
1854	Jenkins, Capt. Griffith, I.N., C.B. *East India Club, St. James's-square, S.W., and Derwen, Welch Pool, Montgomeryshire.*
1837	*Jenkins, R. Castle, Esq. *Beachley, near Chepstow.*
1854	*Jennings, William, Esq., M.A. 13, *Victoria-street, Westminster, S.W.*
1862	Jerdein, John, Esq.
1860	Jermyn, Rowland Formby, Esq. *War Office, S.W.*
1860	980 Jessopp, Rev. Augustus, M.A., Head Master, King Edward VI. School. *Norwich.*
1864	*Jeula, Henry, Esq. *Lloyd's, E.C.*
1864	*Jeyes, F. F., Esq. *Castle-hill, Ealing, W.*
1858	Johnson, Capt. Clement. *Carlton Club, S.W.; and* 1, *Whitehall, S.W.*
1847	Johnson, Edmund Chas., Esq. 20, *Arlington-street, S.W.; and* 6, *Savile-row, W.*
1859	*Johnson, Henry, Esq. 39, *Crutched-friars, E.C.*
1854	Johnson, John Hugh, Esq.
1861	Johnson, William, Esq., R.N. *R. T. Y. Club,* 7, *Albemarle-street, W.*
1843	Johnston, Alex. Keith, Esq., F.R.S.E., Hon. Mem. Berl. Geog. Soc., etc. *March-hall-park; and* 4, *St. Andrew-square, Edinburgh.*
1856	Johnston, A. R., Esq., F.R.S. *Athenæum Club, S.W.; and* 25, *Mount-street, W.*
1857	990 Johnston, J. Brookes, Esq. 29, *Lombard-street, E.C.*
1858	Johnston, Capt. J. Gilbert. 8, *York-terrace, Regent's-park, N.W.*

Year of Election.		
1853		Johnstone, Sir John V. B., Bart., M.P., D.C.L. 27, *Grosvenor-square, W.; and Hackness-hall, near Scarborough.*
1858		Jones, Capt. Edward Monckton, 20th Regt.
1864		Jones, Capt. Felix. 7, *Walton-villas, Brompton, S.W.*
1851		Jones, Lieut.-General Sir Harry D., R.E., K.C.B. *R. M. College, Farnborough Station, Hants.*
1857		Jones, Capt. Jenkin, Bombay Engineers. 1, *Lennard-place, Circus-road, St. John's-wood, N.W.; and India.*
1862		Jones, John, Esq. 338, *Strand, W.C.*
1861		Jones, John Pryce, Esq. *Grove-park School, Wrexham.*
1861		Jones, Sir Willoughby, Bart. *Cranmer-hall, Fakenham, Norfolk.*
1865	1000	Jones-Byrom, Commander W. H., R.N. *Leek, Staffordshire; and Army and Navy Club, S.W.*
1863		Joshua, Moss, Esq. *Melbourne; and* 22, *Clifton-gardens, Maida-hill, W.*
1863		Jourdain, Frederick John, Esq. 10, *Austin-friars, E.C.*
1855		Kane, Major Fred. A. C., 15th Regt. Bombay N.I. *Junior U. Service Club, S.W.*
1858		Kay, David, Esq. 1, *Erskine-place, Edinburgh.*
1860		Keate, R. W., Esq., Lieutenant-Governor, *Trinidad.*
1857		Keating, Sir Henry Singer, Q.C., M.P., one of the Judges of the Court of Common Pleas. 11, *Prince's-gardens, S.W.*
1857		Keene, Rev. C. E. Ruck. *Swyncombe-park, Henley-upon-Thames.*
1863		Keir, Simon, Esq. *Conservative Club, S.W.*
1845		*Kellett, Rr.-Adm. Henry, C.B. *Clonmel, Ireland.*
1861	1010	Kelly, William, Esq. 6, *Belgrave-street South, Pimlico, S.W.; and* 50, *Rue des Vieillards, Boulogne-sur-Mer.*
1860		*Kemball, Col. Arnold Burrowes, C.B., Indian Army. *H.M.'s Consul-General, Bagdad; and* 6, *Chester-place, Hyde-park, W.*
1863		Kempster, J., Esq. 1, *Portsmouth-place, Kennington-lane, Surrey, S.*
1860		Kendall, Henry, Esq., Consul for Peru. 11, *New Broad-street, E.C.; and The Limes, Mortlake, S.W.*
1861		Kennard, Adam Steinmetz, Esq. 4, *Fenchurch-street, E.C.*
1859		Kennard, Coleridge J., Esq. 14, *Lombard-street, E.C.; and* 13, *Prince's-terrace, Prince's-gate, S.W.*
1861		Kennard, Robert William, Esq., M.P. 37, *Porchester-terrace, Hyde-park, W.*
1861		Kennedy, Edward Shirley, Esq. *Maidenhead.*
1863		Kennedy, Lord Gilbert. *West-court, Wokingham.*
1854		Kennedy, Rev. John, M.A. 4, *Stepney-green, E.*
1851	1020	Kent, John, Esq. *Shafston, Moreton-bay, Australia.*
1864		Ker, Lord Schomberg. 15, *Bruton-street, W.*
1863		Kerr, J. H., Esq, R.N. *Hydrographic Office, S.W.*
1862		Kershaw, Wm., Esq. 16, *St. Mary Axe, E.C.; and Suffolk-lodge, Brixton-road, S.*
1859		Key, Capt. Astley Cooper, R.N., C.B. *United Service Club, S.W.*
1862		Key, J. Binney, Esq. 10, *Kensington-gardens-terrace, W.*

Year of Election.	
1857	·Keysell, Francis P., Esq. *Sycamore-villa*, 35, *Carlton-hill, St. John's-wood, N. W.*
1864	*Kidale, W. W., Esq. *East Dereham, Norfolk.*
1864	Kimber, Dr. E. *Grafton-villa, Loughborough-park, S.*
1846	King, Lieut.-Colonel Edward R., 36th Regt. *Junior United Service Club, S. W.*
1858	1030 King, Rev. Samuel W., A.M. *Saxlingham-rectory, Norwich.*
1861	King, Major W. Ross, Unatt., F.S.A. Scot. *Tertowie, Kinellar, Aberdeenshire; Army and Navy Club, S. W.*
1857	Kinkel, Gottfried, Esq., PH. DR. 23, *Blomfield-road, Maida-hill, W.*
1857	*Kinnaird, Hon. Arthur F., M.P. 2, *Pall-mall East, S. W.*
1860	Kinns, Samuel, Esq., Phil. Dr., F.R.A.S. *Highbury-new-park College, N.*
1858	Kirk, John, Esq., M.D.
1863	Kirke, John, Esq., Barrister. 32, *Harley-street, Cavendish-square, W.*
1861	Kirkland, Sir John. 17, *Whitehall-pl., S. W.; and Foot's-cray-pl., Kent, S.E.*
1835	*Kjaer, Thomas Andreas, Esq. *Hjornet af Kongins Nyetow og Gathersgaden* No. 26, *3d Sahl, Copenhagen.*
1862	Knollys, Lieut.-General W. T., V.-Pres. Council of Military Education. *Eaton-square, S. W.*
1861	1040 Knox, Thomas G., Esq. *India.*
1861	Kyd, Hayes, Esq., M.R.C.S. *Wadebridge, Cornwall.*
1859	Labrow, Valentine H., Esq. *Mitre-court, Temple, E.C.; and Club-chambers, S. W.*
1860	Labuan, Right Rev. F. T. MacDougall, Bishop of.
1849	*Laffan, Capt. Robert Michael, R.E. *Army and Navy Club, S. W.; and Otham-lodge, Kent.*
1859	Lamb, Lieut. Henry, I.N. 108, *Leadenhall-street, E.C.*
1863	*Lambert, Alan, Esq. 2, *Portugal-street, South Audley-street, W.*
1864	Lambert, Charles, Esq. 2, *Queen-st.-place, Upper Thames-street, E.C.*
1864	Lamert, Capt. G. F. 20, *Albemarle-street, W.*
1861	Lamont, James, Esq. *Brooks's Club, S. W.*
1864	1050 Lampson, C. M., Esq. 64, *Queen-street, Cheapside, E.C.*
1838	*Lance, John Henry, Esq., F.L.S. *The Holmwood, Dorking.*
1861	Lane, Edward, Esq. *Peninsular and Oriental S. N. Company*, 122, *Leadenhall-street, E.C.*
1861	*Lang, Andrew, Esq. *Dunmore, Hunter-river, N. S. Wales; and Dunmore, Teignmouth, Devon.*
1859	*Lange, Daniel A., Esq. *Egypt.*
1856	Langler, J. R., Esq., Lecturer, Wesleyan Normal Institution. *Westminster, S. W.*
1857	Lansdowne, Marquis of. *Lansdowne-house, Berkeley-square, W.*
1833	*Larcom, Maj.-General Sir Thomas Aiskew, R.E., K.C.B., F.R.S. *Castle, Dublin.*
1861	Lardner, Col. John. *United Service Club, S. W.*
1859	Larnach, Donald, Esq. 21, *Kensington-palace-gardens, W.*
1854	1060 Latrobe, Ch. J., Esq. *Athenæum Club, S. W.; and Whitbourne-court, Worcester.*
1862	*Laurie, John M., Esq. 4, *St. George's-place, S. W.; and Maxwaelton-house, Thornhill, Dumfriesshire.*

Year of Election.	
1846	*Law, the Hon. H. Spencer, M.A. 1, *Lowndes-st., S.W.; and Ellington-h., Ramsgate.*
1830	Law, William J., Esq. 63, *Upper Seymour-street, W.; 33, Lincoln's-inn-fields, W.C.; and 5, Sussex-square, Brighton.*
1861	Lawrence, Edward, Esq. *Beechmont, Aigburth, Liverpool.*
1862	*Lay, Horatio, N., Esq., Commissioner of Foreign Customs in China.
1857	Layard, Austen H., Esq., M.P., D.C.L. 130, *Piccadilly, W.*
1860	Leader, Nicholas P., Esq., M.P. *Conservative Club, S.W.; and Dromagh, Cork.*
1863	*Leaf, Chas. J., Esq. *Old-change, E.C.; and The Rylands, Norwood, S.*
1861	*Learmonth, Dr. John. *Ryde, Isle of Wight.*
1853	1070*Le Breton, Francis, Esq. 21, *Sussex-place, Regent's-park, N.W.*
1861	Leckie, Patrick C., Esq. 7, *Palace-road, Roupell-park, Streatham, S.*
1830	*Lee, John, Esq., LL.D., D.C.L., Pres. of the R. Astr. Soc., F.R.S., F.S.A., F.R.S.N.A., &c. 5, *College, Doctors'-commons, E.C.; and Hartwell-house, near Aylesbury, Bucks.*
1839	Lee, Thomas, Esq. *Great Barr, Staffordshire.*
1861	Lefevre, George Shaw, Esq. 8, *Spring-gardens, S.W.*
1833	*Lefevre, Sir John George Shaw, M.A., D.C.L., F.R.S., Vice-Chancellor of the University of London. 8, *Spring-gardens, S.W.*
1853	Lefroy, General John Henry, R.A., F.R.S. *Royal Arsenal, Woolwich, S.E.*
1862	Leggatt, Clement Davidson, Esq. 2, *Upper Gower-street, Bedford-sq., W.C.*
1861	Legh, Wm. John, Esq., M.P. 37, *Lowndes-square, S.W.; and Lyme-park, Cheshire.*
1861	*Lehmann, Frederick, Esq. 139, *Westbourne-terrace, W.*
1845	1080Leigh, John Studdy, Esq. 54, *Leinster-square, Kensington-gardens, W.*
1863	Le Mesurier, Henry P., C.E. *St. Martin's, Guernsey.*
1863	Le Messurier, M.-Gen., A.P. 2, *Stanhope-terrace, Hyde-park, W.*
1836	Lemon, Sir Charles, Bart., F.R.S., &c. *Carclew, near Falmouth, Cornwall.*
1857	*Lenox, George Wm., Esq. 34, *Portland-place, W.; and Pont-y-Pridd, Glamorganshire.*
1856	Leslie, the Hon. G. W. *House of Commons, S.W.; and 4, Harley-street, W.*
1859	Leslie, Walter D., Esq. *Arthur's Club, St. James's-street, S.W.*
1862	Leslie, Wm., Esq., M.P. *Warthill, Aberdeenshire; and Carlton Club, S.W.*
1840	*Letts, Thomas, Esq. 8, *Royal Exchange, E.C.*
1863	Leveaux, E. H., Esq. 25, *The Cedars, Putney, S.W.*
1857	1090Leverson, George B. C., Esq. 73, *Gloucester-terrace, Hyde-park, W.*
1862	Levick, Joseph, Esq. 8, *Great Winchester-street, Old Broad-street, E.C.*
1859	Levinsohn, Louis, Esq. 7, *Finsbury-square, E.C.*
1859	Lewis, Rev. Evan, B.A. *Rothwell, Northamptonshire.*
1852	Leycester, Commander Edmund M., R.N., Superintendent of Packets and Transports. *Admiralty-office, Liverpool.*
1861	Leyland, Luke Swallow, Esq. *The Leylands, Hatfield, Doncaster.*
1859	Lichfield, Thomas George, Earl of. *Shugborough, Staffordshire.*
1856	Lilford, Thomas Lyttleton Powys, Lord. 10, *Grosvenor-place, W.*
1860	Lindsay, H. Hamilton, Esq. 22, *Berkeley-square, W.*
1857	Lindsay, Maj.-Gen. the Hon. J., Gren. Guards, M.P. 20, *Portman-square, W.*

Year of Election.	
1861	1100 Lindsay, W. Lauder, Esq., M.D., F.R.S. Edin., F.L.S. London. *Gilgal, Perth, N.B.*
1855	*Lindsay, Wm. S., Esq., M.P. *Manor-house, Shepperton, Middlesex.*
1861	Lloyd, Alexander Ogilvie, Esq., M.A. *Hazelcroft, Ripley, Yorkshire.*
1857	*Lloyd, George A., Esq. 2, *Royal Exchange-buildings, E.C.*
1864	Lloyd, W., Esq. *Wednesbury, near Birmingham.*
1861	Lluellyn, Capt. Richard. 20, *Montagu-square, W.*
1863	Loch, George, Esq. 12, *Albemarle-street, W.*
1859	Loch, Henry Brougham, Esq. *Government-house, Isle of Man.*
1861	Loch, John Charles, Esq. 12, *Albemarle-street, W.; and Hong-Kong.*
1857	Loch, William Adam, Esq. 8, *Great George-street, Westminster, S.W.*
1864	1110 Locke, John, Esq. 83, *Addison-road, Kensington.*
1858	Lockhart, William, Esq., F.R.C.S. *Park-villas, Granville-park, Blackheath, S.E.; and China.*
1860	Lockwood, James Alfred. *United Arts Club, Hanover-square, W.*
1856	*Logan, Sir William Edmond, F.R.S. *Montreal, Canada.*
1860	Londesborough, Wm. Henry Forester, Lord. *Thomas's Hotel,* 25, *Berkeley-sq., W.*
1830	Long, George, Esq., M.A. 22, *Buckingham-street, Brighton.*
1839	*Long, Henry L., Esq. *Travellers' Club, S.W.; and Hampton-lodge, Farnham, Surrey.*
1857	*Long, W. Beeston, Esq.
1853	Longden, Morrell D., Esq. 4, *Ennismore-place, Hyde-park, S.W.*
1847	Longman, Thos., Esq. *Paternoster-row, E.C.; and* 8, *Sussex-sq., Hyde-park, W.*
1858	1120 Longman, William, Esq. 36, *Hyde-park-square, W.*
1861	Lonsdale, Arthur Pemberton, Esq.
1860	Looker, William Robert, Esq.
1861	Lorimer, George B., Esq.
1863	Lovell, Capt. 6, *Granville-park-villas, Blackheath, S.E.*
1856	Lovett, Phillips Cosby, Esq. *Liscombe-ho., Liscombe, Leighton Buzzard, Bucks.*
1861	Low, Robert, Esq. 17, *Woburn-square, W.C.*
1863	Low, S. P., Esq. 55, *Parliament-street, S.W.*
1858	Lowden, Rev. George Rouse. 12, *Leinster-gdns., Hyde-park, W.; and Uxbridge.*
1859	Lowe, Capt. W. Drury. *Myria, Bettws-y-Coed, Llanrwst, North Wales.*
1863	1130 Lowndes, E. C., Esq. 84, *Eaton-place, S.W.*
1830	Lowry, Joseph Wilson, Esq. 45, *Robert-street, Hampstead-road, N.W.*
1860	Loyd, Col. W. K. *Union Club, S.W.*
1860	Luke, William, Esq., Bengal Civil Service. 93, *Inverness-terr., Hyde-park, W.*
1860	Lumsden, Rev. Robert Comyn, M.A. *Cheadle, Manchester.*
1860	Lush, Robert, Esq., Q.C. *Balmoral-house, Avenue-road, Regent's-park, N.W.*
1830	*Lyell, Sir Charles, M.A., LL.D., F.R.S. 53, *Harley-street, Cavendish-square, W.*
1837	*Lynch, Capt. H. Blosse, I.N., C.B., F.R.A.S. *Athenæum Club, S.W.*
1861	*Lynch, Thomas Kerr, Esq. 31, *Cleveland-square, Hyde-park, W.*
1858	Lyne, Francis, Esq.
1862	1140 Lyon, David, Esq. 31, *South-street, Park-lane, W.*

Year of Election.	
1862	*Macarthur, Major-Gen. Sir Edward, C.B. 38, *Rutland-gate, S. W.*
1863	Macbraire, James, Esq. *Broadmeadows, Berwick-on-Tweed.*
1862	Macdonald, Chessborough C., Esq. 32, *Belsize-park, Hampstead, N. W.*
1863	Macdonald, Duncan George Forbes, Esq., C.E. 13, *Royal Exchange, E.C.*
1830	MacDonnell, John, Esq. 48, *Grove-end-road, St. John's-wood, N. W.*
1843	Macdonnell, Sir Richard Graves, C.B., late Governor of S. Australia. 36, *Winchester-street, S. W.*
1858	MacDougall, Alex. H., Esq. 44, *Parliament-street, Westminster, S. W.*
1863	Macfarlan, George, Esq. *Christ-church, Canterbury, New Zealand.*
1861	MacGeorge, Colonel, Bengal Army. 18, *Cleveland-square, W.*
1856	1150 Macgregor, Alexander, Esq. *Sec. to the West India Committee Rooms, Walbrook-house, Walbrook, E.C.*
1839	Macintosh, Lieut.-General Alex. Fisher, K.H. 7, *Tilney-street, Park-lane, W.*
1861	Mackintosh, Alexander Brodie, Esq. *Oriental Club, W.; and Dunoon, Scotland.*
1845	*Macintyre, Patrick, Esq., F.S.A., Off. Assoc. Inst. Act. 9, *Chapel-street, Stratford-on-Avon.*
1859	Mackay, Rev. Alexander, A.M. *Rhynie, Aberdeenshire.*
1860	Mackay, Thomas Miller, Esq. 24, *Leinster-gardens, Bayswater, W.*
1859	*Mackean, Thos. W. L., Esq. 24, *Oxford-square, Hyde-park, W.*
1862	Mackenzie, Colin J., Esq. *Windham Club, S. W.*
1845	Mackenzie, Right Hon. Holt, F.R.A.S. *Athenæum Club, S. W.; and* 28, *Wimpole-street, W.*
1861	Mackenzie, Sir James J. Randall, Bart. *Seatwell, Rosehaugh, Munlochy, N.B.*
1860	1160 *Mackenzie, James T., Esq. 69, *Lombard-street, E.C.*
1863	Mackenzie, John H., Esq. *Wallington, Carshalton, Surrey.*
1864	*Mackeson, Edward, Esq. 59, *Lincoln's-inn-fields, W.C.*
1830	Mackillop, James, Esq., F.R.A.S. 30, *Grosvenor-square, W.*
1862	Mackinly, D., Esq. *Oriental Club, W.*
1864	Mackinnon, C. D., Esq. 40, *Wigmore-street, W.*
1861	Mackinnon, Lachlan, Esq. *Reform Club, S. W.; and Bittacy-house, Mill-hill, N. W.*
1855	Mackinnon, Wm. Alex., Esq., M.P., F.R.S. 4, *Hyde-park-place, W.*
1860	Mackirdy, Lt.-Col. Elliot, 69th Rgt. *U. S. Club, S. W.; and Tonghoo, Birmah.*
1860	Maclean, William Crichton, Esq. 5, *Camperdown-terrace, Great Yarmouth.*
1859	1170 Maclear, Sir Thomas. *Astronomer Royal, Cape of Good Hope.*
1859	MacLeay, George, Esq. *Athenæum Club, S. W.; and Sydney.*
1855	Maclure, Andrew, Esq. *Maclure, Macdonald, and Macgregor,* 37, *Walbrook, E.C.*
1861	Maclure, John William, Esq. 2, *Bond-street, Manchester.*
1860	Macmillan, Alex., Esq. 23, *Henrietta-st., Covent-garden, W.C.*
1855	Macnab, John, Esq. *Stead's-place, Leith-walk, Edinburgh.*
1856	*Macpherson, Duncan, Esq., M.D., Inspector-General of Hospitals.
1861	Macpherson, William, Esq. 6, *Stanhope-street, Hyde-park-gardens, W.*
1845	Macqueen, James, Esq., K.G., Tower and Sword of Portugal. 4, *Alma-terrace, Hammersmith, W.*
1864	Macrae, Colin W., Esq. *Oriental Club, Hanover-square, W.*

Year of Election.

1863 1180 McArthur, Alex., Esq. *Raleigh-hill, Brixton-rise, S.*
1860 McClintock, Capt. Sir Francis Leopold, R.N. *United Service Club, S.W.*
1863 McConnell, James E., Esq., C.E. *Dean's-yard, Westminster, S.W.; and The Woodlands, Great Missenden, Bucks.*
1861 *McConnell, W. R., Esq., Barrister-at-Law. 12, *King's-bench-walk, E.C.; and Charleville, Belfast.*
1862 McCosh, John, Esq., M.D. *Junior U. S. Club, S.W.*
1859 McGrath, John C., Esq. *Reform Club, S.W.*
1855 McGregor, Duncan, Esq. *Board of Trade, S.W.; and Athenæum Club, S.W.*
1858 McKerrell, Robert, Esq. 45, *Inverness-terrace, W.; and Mauritius.*
1855 *M'Clure, Captain Sir Robert J. le M., R.N. *H.M.S. 'Esk.'*
1862 M'Dougall, Geo. Fred., Esq., R.N. *Admiralty Survey, Oban, N.B.*
1852 1190 M'Leod, J. Lyons, Esq., late Consul for Mozambique.
1852 M'Leod, Walter, Esq. *Head Master of the Royal Military Asylum, Chelsea, S.W.*
1839 M'Neil, The Right Hon. Sir John, G.C.B. *Granton, near Edinburgh.*
1861 *Maguire, Capt. Rochfort, R.N. *United Service Club, S.W.*
1853 Majendie, Ashhurst, Esq., F.R.S. *Athenæum Club, S.W.;* 152, *Albany-street, Regent's-park, N.W.; and Hedingham-castle, Essex.*
1845 *Major, Richard Henry, Esq. *British Museum, W.C.*
1858 Malby, John Walter, Esq. 15, *Richmond-villas, Seven-sisters'-rd., Holloway, N.*
1853 *Malby, Thomas, Esq. 2, *Park-villas, Seven-sisters'-road, Holloway, N.*
1862 *Malcolm, Capt. Edward Donald, R.E. *Chatham.*
1863 Malcolm, Jas., Esq. 22, *Prince's-gate, Knightsbridge, W.*
1843 1200 *Malcolm, W. E., Esq. *Burnfoot, Langholme, near Carlisle.*
1853 *Mallet, Charles, Esq. *Audit Office, W.C.; and Belmont, Hampstead, N.W.*
1836 *Manchester, James Prince Lee, Bishop of, F.R.S., &c. *Athenæum Club, S.W.; and Sedgley-hall, Manchester.*
1830 *Mangles, Capt. James, R.N., F.R.S. *Fairfield, near Exeter.*
1860 Mann, James Alexander, Esq., M.R.A.S. *Kensington-palace, W.*
1856 Manning, Frederick, Esq. *Byron-lodge, Leamington; and* 8, *Dover-street, W.*
1859 Mantell, Wm. Walter, Esq.
1859 Marett, Charles, Esq., M.A., Barrister-at-Law. 56, *Chancery-lane, W.C.*
1860 Mariette, Prof. Alphonse, M.A. 27, *St. Stephen's-square, Bayswater, W.*
1830 *Marjoribanks, Edward, Esq. 34, *Wimpole-street, W.*
1854 1210 Markham, Clements R., Esq. *India Office, S.W.; and* 21, *Eccleston-sq., S.W.*
1836 *Markham, Edward, Esq. 45, *Welbeck-street, Cavendish-square, W.*
1857 Marlborough, George, Duke of. *Blenheim, Woodstock.*
1864 Marsden, Rev. J. H. *Great Oakley, near Harwich, Essex.*
1857 *Marsden, Robert C., Esq. 14, *Hanover-terrace, Regent's-park, N.W.*
1857 Marsh, Matthew Henry, Esq., M.P. *Oxford and Cambridge Club, S.W.; and* 41, *Rutland-gate, S.W.*
1862 Marshall, Capt. J. G. Don. 3, *Montpellier-place, Gloucester.*
1854 Marshall, Jas. Garth, Esq. *Headingley, nr. Leeds; and Monk Coniston, Ambleside.*

Year of Election.	
1862	Marshall, William, Esq. *Oxford and Cambridge Club, S.W.*
1859	*Marsham, the Hon. Robert. *The Mote, Maidstone, Kent.*
1857	1220 Marshman, J. C., Esq. 7, *Kensington-palace-gardens, W.*
1857	Martin, Francis P. B., Esq.
1861	Martin, Henry, Esq. *Sussex-house, Highbury-new-park, N.*
1860	*Martin, Richard Biddulph, Esq. 21, *Eaton-square, S.W.*
1862	Martin, Thomas, Esq. 5, *Compton-terrace, N.*
1845	*Matheson, Sir James, Bart., M.P., F.R.S. 13, *Cleveland-row, S.W.; and Achany, Bonar-bridge, Sutherlandshire, &c.*
1858	Mathieson, James Ewing, Esq. 77, *Lombard-street, E.C.; and* 16, *Queen's-gardens, Bayswater, W.*
1863	Matthie, M.-Gen. James. *Gothic-house, Upper Hamilton-terrace, St. John's-wood, N.W.*
1837	*Maughan, Captain P., Indian Navy, F.R.A.S. *Roseneath Manse, Helensburgh.*
1855	May, Daniel John, Esq., R.N. *Cape of Good Hope. Care of Case and Loudensack.*
1858	1230 Mayer, Joseph, Esq., F.S.A. 68, *Lord-street, Liverpool.*
1861	Mayers, William S. F., Esq., Interpreter to H.M. Consulate. *Shanghai.*
1862	Mayne, Commr. Richard Charles, R.N. *H.M.S. 'Eclipse;' and* 80, *Chester-square, S.W.*
1858	Mayo, Capt. John Pole. *Army and Navy Club, S.W.*
1863	Meade, the Hon. Robert Henry. *Foreign Office, S.W.; and* 3, *Belgrave-square, S.W.*
1862	*Medlycott, Lieut. Mervyn B., R.N. *Care of Messrs. Woodhead.*
1860	*Meinertzhagen, Daniel, Esq. 10, *Moorgate-street, E.C.; and* 28, *Devonshire-place, Portland-place, W.*
1854	Melvill, Col. Sir Peter Melvill, Mil. Sec. to the Bombay Gov. 27, *Palmeira-square, Brighton.*
1838	Melvill, Philip, Esq., F.R.A.S. *Ethy House, Lostwithiel, Cornwall.*
1863	Mercier, Rev. J. P. *St. Mark's College, Chelsea, S.W.*
1842	1240 *Merivale, Herman, Esq., Under Sec. of State for India. *India Office, Victoria-street, Westminster, S.W.; and* 26, *Westbourne-terrace, W.*
1863	Meurant, Capt. E., 83rd Regt. *Junior U. S. Club, S.W.*
1860	Michell, Thomas, Esq. *St. Petersburg.*
1863	*Michie, A., Esq. 26, *Austin Friars, E.C.*
1848	Middleton, Capt. Sir G. N. Broke, Bart., R.N. *H.M.S. 'Hero,' Sheerness; and Broke-hall, Suffolk.*
1859	Miland, John, Esq. 4, *Mount-street, Berkeley-square, W.*
1861	Miles, Pliny, Esq. 43, *Great Tower-street, E.C.*
1860	Miles, Rev. R. *Bingham, Notts.*
1861	Miller, George T. 59, *Portland-place, W.*
1861	*Miller, Lieut. Henry Matthew, R.N. *The Grove, Exeter; and Junior United Service Club, S.W.*
1853	1250 *Miller, Captain Thomas, R.N. *H.M.S. 'Clio;' and United Service Club, S.W.*
1861	Milligan, Joseph, Esq. *Athenæum Club, S.W.; and* 15, *Northumberland-st. W.C.*

Year of Election.	
1857	Mills, Arthur, Esq., M.P. 34, *Hyde-park-gardens, W.*
1863	*Mills, John R., Esq., M.P. *Kingswood-lodge, Englefield-green.*
1864	Mills, Rev. John. 40, *Lonsdale-square, N.*
1863	*Milton, Viscount. 4, *Grosvenor-square, W.*
1860	Milman, Capt. Everard, Madras Horse Artillery. 9, *Berkeley-square, W.*
1860	Mitchell, Capt. Alexander. 6, *Great Stanhope-street, Park-lane, W.*
1862	*Mitchell, George, Esq. 22, *Bolton-street, Piccadilly, W.*
1864	Mitchell, J. W., Esq. *Mansfield, Woodhouse, Notts.*
1864	1260 Mitchell, Thomas, Esq., C.E. *Oldham.*
1859	Mitchell, William, Esq. 54, *Gracechurch-street, E.C.; and* 6, *Hyde-park-gate, Kensington-gore, W.*
1851	*Mocatta, Frederick D., Esq. 35, *Gloucester-place, Portman-square. W.*
1853	Moffatt, George, Esq., M.P. 103, *Eaton-square, S.W.*
1861	Mollison, Alexander Fullerton, Esq. 10, *Lansdowne-terrace, Notting-hill, W.*
1861	Money, Lieut.-Col. George Henry. 9, *Berkeley-street, W.*
1842	*Montagu, Major Willoughby. *Clapham-common, S.*
1862	*Montague, Capt. Horace. 24, *Chapel-street, Park-lane, W.*
1842	*Monteagle, Thomas, Lord, F.R.S. 7, *Park-street, Westminster, S.W.; and Mount Trenchard, Limerick.*
1830	*Montefiore, Sir Moses, Bart., F.R.S., F.R.S.N.A. 7, *Grosvenor-gate, Park-lane, W.; and East-cliff-lodge, Ramsgate.*
1830	1270 *Monteith, Lieut.-General William, E.I.C. Eng., F.R.S. 11, *Upper Wimpole-street, W.; and Oriental Club, W.*
1859	Montgomerie, F. Butler, Esq. 2, *Cleveland-row, St. James's, S.W.; and St. Leonard's-on-Sea.*
1864	Montgomerie, Lieut.-General P. 7, *Queen's-gardens, Hyde-park, W.*
1859	Montgomerie, Capt. T. G., Beng. Engrs., 1st Assist. Trig. Survey. *Dehra Dún.*
1860	Montgomery, Robert Martin, Esq. 6, *Ashley-place, Victoria-street, S.W.*
1839	Moody, Lieut.-Colonel R. C., R.E. *British Columbia; and Junior United Service Club, S.W.*
1861	Moon, Rev. Edward Graham. *Fetcham, Surrey.*
1859	Moon, William, Esq. 104, *Queen's-road, Brighton.*
1857	*Moor, Rev. Allen P., M.A., F.R.A.S. *Sub-Warden St. Augustine College, Canterbury.*
1857	Moore, Captain John, R.N., C.B. 102, *Piccadilly, W.*
1861	1280 Moore, John Carrick, Esq. *Corswall, Wigtonshire; Geological Society, W.C.; and* 23, *Bolton-street, W.*
1857	Moore, Major-General W. Y. *United Service Club, S.W.*
1863	More, R. Jasper, Esq.
1861	Morgan, Junius Spencer, Esq. 13, *Prince's-gate, Hyde-park, W.*
1861	Morgan, William, Esq., R.N. *Admiralty House, Sheerness.*
1839	*Morris, Charles, Esq. *University Club, S.W.*
1861	Morrison, Captain Peter.
1863	Morrison, Lieut.-Col. J. D. 7, *Albemarle-street, W.*

Year of Election.	
1861	Mount, Frederick J., Esq., M.D., Surgeon-Major and Inspector-General of Prisons, Bengal Army, &c. *Athenæum Club, S.W.; and India.*
1858	Mudie, Charles Edward, Esq. *The Green, Hampstead, N.W.*
1858	1290 Mueller, Ferdinand, Esq., M.D., PH. DR. *Director of the Botanical Gardens, Melbourne.*
1862	Muir, Francis, Esq., LL.D., Surveyor H.M.'s Revenue of Stamps and Taxes. 27, *Great George-street, Westminster, W.*
1855	Muir, Thomas, Esq. 24, *York-terrace, Regent's-park, N.W.*
1859	Murchison, Kenneth R., Esq. *Manor-house, Bathford, Bath.*
1830	*Murchison, Sir Roderick Impey, K.C.B., G.C.ST.S., M.A., D.C.L., V.P.R.S., G.S., and L.S., Director-General of the Geological Survey of Great Britain and Ireland, Trust. Brit. Mus., Hon. Mem. R.S. of Ed., R.I.A., Mem. Acad. St. Petersburg, Berlin, Stockholm, Brussels, and Copenhagen, Corr. Ins. Fr., *etc. etc.* 16, *Belgrave-square, S.W.; and* 28, *Jermyn-street, S.W.*
1864	Murchison, Capt. R. M. *Gay-street, Bath.*
1830	*Murdock, Thomas W. C., Esq. 8, *Park-street, Westminster, S.W.; and River-bank, Putney, S.W.*
1860	Murray, George J., Esq. *Hook-cottage, Horndean; and Junior Carlton Club.*
1851	*Murray, Rear-Adm. the Hon. Henry Anthony. 4D, *Albany-chambers, W.*
1844	*Murray, James, Esq. *Foreign Office, S.W.*
1830	1300 Murray, John, Esq. 50, *Albemarle-street, W.; and Newstead, Wimbledon, S.W.*
1860	*Murray, Lt. W., 68th Beng. N. Inf., Topo. Assist. G. Trig. Survey. *Mussoorie, India.*
1853	Napier, Maj.-General Geo. Thomas Conolly, C.B., *Junior U.S. Club, S.W.*
1861	Napier, William, Esq.
1857	Napier, Hon. William. 54, *Green-street, Grosvenor-square, W.*
1859	*Nasmyth, Capt. David J., 1st Assist. Trigonometrical Survey. *Bhooj, Bombay.*
1861	Neave, Sir Richard Digby, Bart. *Travellers' Club, S.W.;* 78, *Eccleston-square, S.W.; and Dagnam-park, Romford, Essex.*
1857	*Nesbitt, Henry, Esq. 19, *Pembury-road, Lower Clapton, N.E.*
1856	Newman, Thomas Holdsworth, Esq. *Norfolk-street, Park-lane, W.*
1856	Nicholson, Sir Charles, Bart., D.C.L., Chancellor of the University, Sydney. 19, *Portland-place, W.*
1861	1310 Nicholson, Lt.-Col. Lothians, R.E. 26, *Suffolk-street, Pall-mall, S.W.; and* 11, *James-street, Buckingham-gate, S.W.*
1844	Nicolay, Rev. Chas. Grenfell. *Bahia.*
1836	Nicolson, Rear-Adm. Sir Frederick Wm. Erskine, Bt., R.N. 15, *William-street, Lowndes-square.*
1864	Nissen, H. A., Esq. *Mark-lane, E.C.*
1858	Nix, John H., Esq. 77, *Lombard-street, E.C.*
1860	Nixon, Brinsley de Courcy, Esq. *Athenæum Club, S.W.*

Year of Election.	
1861	Noel, the Hon. Roden. 11, *Chandos-street, Cavendish-square, W.; and Exton-hall, Oakham, Rutlandshire.*
1857	*Nolloth, Captain Matthew S., R.N. *Hong-Kong; United Service Club, S. W.; and Peckham, Surrey, S.E.*
1860	Norris, Harry, Esq. *Colonial Office, S.W.; and 4, Little St. James-street, S.W.*
1861	North, Alfred, Esq. *Salcombe-hill-house, Sidmouth.*
1856	1320 North, Frederic, Esq., M.P. 3, *Victoria-street, Westminster, S.W.; and Hastings-lodge, Hastings.*
1862	Notman, Henry Wilkes, Esq. 7, *Great Marlborough-street, W.*
1862	Nourse, Henry, Esq. *Conservative Club, S.W.*
1858	*Oakeley, R. Banner, Esq. *Oswaldkirk-hall, Yorkshire.*
1859	Oakley, Rev. Charles E., M.A.
1863	O'Callaghan, Chas., Esq., Staff Surgeon. *Killarney, Ireland.*
1856	O'Connor, Col. Luke Smyth, C.B., late Governor of the Gambia. *U.S. Club, S.W.*
1858	Ogilvie, Edward D., Esq. *Yulgillar, Clarence river, New South Wales.*
1863	Ogilvy, Col. Thos. 23, *Grafton-st., Piccadilly, W; and Ruthven, Forfarsh., N.B.*
1864	Ogilvy, Thos., Esq. 4, *Park-crescent, Portland-place.*
1859	1330 Ogle, John W., Esq., M.D. 13, *Upper Brook-street, W.*
1861	Oldershaw, Capt. Robert Piggott. 74, *Warwick-square, Belgrave-road, S.W.*
1863	Olding, J. A., Esq. 10, *Lee-road, Blackheath, S.E.*
1855	Oliphant, Laurence, Esq. *Athenæum Club, S.W.; and 2, Berkeley-street, Piccadilly, W.*
1861	Oliphant-Ferguson, G. H., Esq. *Broadfield-house, Carlisle.*
1853	Oliveira, Benjamin, Esq., F.R.S. 8, *Upper Hyde-park-street, W.*
1845	*Ommanney, Adml. Erasmus, R.N., F.R.A.S. 14, *Great George-street, S.W.; United Service Club, S.W.; and Gibraltar.*
1838	*Ommanney, H. M., Esq. *Blackheath, S.E.*
1864	O'Reily, E., Esq.
1853	Osborn, Sir George R., Bart. *Travellers' Club, S.W.; and Chicksand-priory, Beds.*
1856	1340 Osborn, Capt. Sherard, R.N., C.B., Officier de Légion d'Honneur, etc. *Junior United Service Club, S.W.; and Erith, Kent, S.E.*
1861	Osborn, Capt. Willoughby. *Political Agent, Bhopal, Schira, India.*
1852	Oswell, William Cotton, Esq.
1860	Otter, Charles, Esq. 47, *Montagu-square, W.*
1855	Otway, Arthur John, Esq. *Army and Navy Club, S.W.*
1860	*Ouvry-North, the Rev. J. *East Acton, Middlesex, W.*
1844	*Overstone, Samuel, Lord, M.A., M.R.I. 2, *Carlton-gardens, S.W.; and Wickham-park, Surrey.*
1846	*Oxford, Rt. Rev. Samuel Wilberforce, Bishop of, F.R.S., F.S.A. 26, *Pall-mall, S.W.; Cuddesden-palace, Wheatley, Oxfordshire; and Lavington, Sussex.*

Year of Election.	
1861	Page, Thomas, Esq., C.B., F.G.S. 3, *Adelphi-terrace, W.C.; and Tower Cressy, Aubrey-road, Bayswater, W.*
1853	Pakington, Right Hon. Sir John Somerset, Bart., M.P. 41, *Eaton-square, S.W.; and Westwood-park, Droitwich, Worcestershire.*
1856	1350 Palliser, Captain John. *Comrah, Kilmackthomas, Waterford; and National Club, Whitehall-gardens, S.W.*
1855	Palmer, Major Edm., R.A. 7, *Home-park, Stoke, Devonport.*
1862	Palmer, Rev. Jordan, M.A., F.S.A., Chaplain to St. Ann's Royal Society. *Streatham, S.*
1838	*Palmer, Samuel, Esq.
1851	Palmerston, Henry John, Lord Viscount, M.P., K.G., G.C.B., F.R.S., &c. *Cambridge-house, Piccadilly, W.; and Broadlands, Romsey, Hants.*
1863	*Paris, H.R.H. Le Comte de. *Claremont.*
1849	*Parish, Commr. John E., R.N. *H.M.S. 'Ardent;' and Army and Navy Club, S.W.*
1833	*Parish, Sir Woodbine, K.C.H., F.R.S., &c. *Quarry-house, St. Leonard's-on-Sea.*
1864	Parish, Capt. A. *Chislehurst, Kent.*
1862	Park, Lt.-Colonel A., H.M. Indian Army. 41, *Porchester-square, W.*
1862	1360 Parker, Henry T., Esq. 3, *Ladbroke-gardens, Kensington-park, W.*
1862	Parker, Robert Deane, Esq. *Union Club, S.W.; and Barham, Canterbury.*
1850	Parkes, Sir Harry S., C.B., &c. *Oriental Club, W.; Athenæum Club, S.W.*
1850	*Parkyns, Mansfield, Esq., F.Z.S. *Arthur's Club, St. James's-street, S.W.; and Woodborough-hall, Southwell.*
1859	Pasteur, Marc Henry, Esq. 58, *Mincing-lane, E.C.*
1857	Paton, Andrew A., Esq. *H.B.M.'s V.-Consul, Missolonghi, Greece.*
1863	Pattinson, J., Esq. 21, *Bread-street, E.C.*
1858	Paul, Joseph, Esq. *Ormonde-house, Ryde, I. of Wight.*
1847	*Paynter, William, Esq., F.R.A.S. 21, *Belgrave-square, S.W.; and Camborne-house, Richmond, Surrey, S.W.*
1855	Peabody, George, Esq. 22, *Old Broad-street, E.C.*
1853	1370 Peacock, George, Esq. *Starcross, near Exeter.*
1860	Pearce, Ebenezer John, Esq., PH. DR., Principal of *Great Ealing School, Ealing, Middlesex, W.*
1863	Pearse, Capt. R. B., R.N. *Arthur's Club.*
1863	Pearson, Fred., Esq. 13, *Cleveland-square, W.*
1853	*Peckover, Alexander, Esq. *Wisbeach.*
1860	*Peek, Henry William, Esq. *Wimbledon-house, S.W.*
1861	Peel, Archibald, Esq. 56, *Portland-place, W.*
1858	Peel, Sir Robert, Bart., M.P. 4, *Whitehall-gardens, S.W.; and Drayton-manor, Tamworth.*
1863	Pember, Geo. H., Esq. *Leigham-avenue, Streatham, S.*
1859	*Pennant, George Sholto Douglas, Esq. *Penrhyn-castle, Bangor.*
1863	1380 *Pennant, Col. S. S. Douglas, M.P. *Penrhyn-castle, Bangor, N.B.*
1853	Percy, Colonel the Hon. Henry M. (Guards). 11, *Portman-square, W.*
1860	Perkins, Frederick, Esq. *Mayor of Southampton.*

Year of Election.	
1860	Perowne, Rev. J. J. Stewart. *Divinity and Hebrew Lecturer, St. David's College, Lampeter, S. Wales.*
1859	Perry, Sir Erskine, Member Indian Council. 36, *Eaton-place, S. W.*
1859	Perry, William, Esq., H.B.M.'s Consul, Panama. *Athenæum Club, S.W.*
1862	*Perry, William, Esq. 9, *Warwick-road, Upper Clapton, N.E.*
1862	Peter, John, Esq. 33, *Prince's-gate, Hyde-park, W.*
1857	*Peters, William, Esq. 35, *Nicholas-lane, Lombard-street, E.C.*
1860	Petherick, John, Esq., H.B.M.'s Consul for the Sudan.
1858	1390 Peto, Sir S. Morton, Bart., M.P. 12, *Kensington-palace-gardens, W.*
1861	Petrie, Alexander S., Esq. 4, *St. Mark's-square, N.W.*
1860	Petrie, Captain Martin, 14th Regiment. *Hanover-lodge, Kensington-park, W.*
1862	Peyton, Col. John L. 93, *Great Russell-street, Bloomsbury, W.C.*
1854	Phelps, William, Esq. 18, *Montagu-place, Russell-square, W.C.*
1862	Phené, John Samuel, Esq. 34, *Oakley-street, Chelsea, S. W.*
1860	Philip, George, Esq. 32, *Fleet-street, E.C.*
1857	Phillimore, Capt. Augustus, R.N. 25, *Upper Berkeley-st., W.; and U.S. Club, S. W.*
1859	Phillimore, Chas. Bagot, Esq. *India Office, S. W.; and* 25, *Upper Berkeley-st., W.*
1843	Phillimore, John George, Esq., Q.C. 19, *Old-buildings, Lincoln's-inn, W.C.*
1863	1400 Phillimore, Sir Robert. 5, *Arlington-street, S. W.*
1860	Phillimore, Wm. Brough, Esq., late Capt. Grenadier Guards. 5, *John-street, Berkeley-square, W.*
1830	*Phillipps, Sir Thomas, Bart., M.A., F.R.S., F.S.A. *Athenæum Club, S. W.; and Middle-hill, Broadway, Worcestershire.*
1854	Phillips, Major-General Sir B. Travell. *United Service Club, S. W.*
1856	Phillips, John, Esq., Solicitor. *Hastings.*
1859	Phinn, Thomas, Esq., Q.C. 50, *Pall-mall, S.W.*
1864	*Pigou, F. A. P., Esq. 7, *Alexander-terrace, Putney, S.*
1861	Pike, Frederick, Esq. 44, *Charing-cross, S. W.*
1852	*Pike, Commander John W., R.N. 26, *Old Burlington-street, W.; Junior United Service Club, S. W.*
1855	Pilkington, James, Esq., M.P. *Reform Club, S. W.; and Blackburn.*
1851	1410 *Pim, Commander Bedford C. T., R.N. *Junior United Service Club, S. W.; and Tathwell-house, Belsize-park, N. W.*
1858	Pincott, James, Esq. *University College, London, W.C.; and Christchurch-road, Roupell-park, Brixton-hill, S.*
1859	Pinney, Colonel William, M.P. 30, *Berkeley-square, W.*
1858	Platen, His Excellency Count.
1860	Playfair, Lieut.-Col. Robert Lambert. *Political Agent, Zanzibar.*
1860	Plowden, Charles Hood C., Esq. 15, *York-street, Portman-square, W.*
1856	*Plowes, John Henry, Esq. 39, *York-terrace, Regent's-park, N. W.*
1834	*Pocock, John I., Esq. *Puckrup-hall, Tewkesbury.*
1862	Pollard, Commander Edwin John, R.N.
1855	*Pollexfen, Capt. J. J. *India.*

Year of Election.	
1837	1420*Pollington, John Charles George, Viscount, F.R.A.S. *Meshley-park, near Leeds.*
1853	Pollock, General Sir George, G.C.B. *Clapham-common, Surrey, S.*
1835	*Ponsonby, Hon. Frederick G. B. 3, *Mount-street, Grosvenor-square, W.*
1860	Pook, Captain John. 6, *Colfe's-villas, Lewisham-hill, S.E.*
1857	Pope, Captain Wm. Agnew. 52, *Charles-street, Berkeley-square, W.*
1863	*Porcher, Commander Edwin A., R.N. 50, *Montagu-square, W.*
1853	Porter, Edwd., Esq. *Athenæum Club, S.W.; and* 26, *Suffolk-street, Pall-mall, S.W.*
1864	Portugal, Chev. Joaquim de. 30, *Gloucester-place, Hyde-park.*
1861	*Pounden, Captain Lonsdale. *Junior United Service Club, S.W.; and Browns-wood, Co. Wexford.*
1862	Povah, Rev. John V., M.A. 16, *Tavistock-square, W.C.*
1852	1430Powell, Lewis, Esq. *Port Lewis, Mauritius.*
1859	Power, E. Rawdon, Esq. 15, *Adam-street, Adelphi, W.C.*
1854	Power, John, Esq. 3, *Ingram-court, Fenchurch-street, E.C.*
1854	Power, John Arthur, Esq., M.A., B.M. 52, *Burton-crescent, W.C.*
1864	Powis, the Hon. E. R.
1864	Powys, Hon. Leopold. 17, *Montagu-street, Portman-square, W.*
1864	Powys, Hon. C. J. F. *Barracks, Mullingar.*
1860	Pratt, Hodgson, Esq.
1853	Price, Jas., Esq., M.D., F.R.C.S., &c. *Brixton, Surrey, S.*
1852	Price, James Glenie, Esq., Barrister-at-Law. 14, *Clement's-inn, W.C.*
1859	1440Price, Major R. Havard, 31st Bengal N. Infantry. *Bengal.*
1860	*Prickett, Rev. Thomas William, M.A., F.S.A. *University Club, S.W.*
1855	*Pringle, Thomas Young, Esq. 14, *Eaton-square, S.W.*
1845	Prinsep, Henry T., Esq. *Little Holland-house, Kensington, W.*
1859	Pritchard, Wm. Thos., Esq. *H.B.M.'s Consul, Fiji.*
1861	*Prodgers, Rev. Edwin. *The Rectory, Ayott St. Peter's, Herts.*
1852	Prout, John William, Esq., M.A., Barrister-at-Law. *Athenæum Club, S.W. and Neasdon, Middlesex, N.W.*
1862	*Puget, Capt. J.
1860	Puller, Arthur Giles, Esq. *Athenæum Club, S.W.; and Youngsbury, Ware.*
1857	Purcell, Edward, Esq., LL.D. 2, *Maze-hill, Greenwich, S.E.*
1859	1450Purdon, Wm. H., Esq. *Executive Engineer, Punjab.*
1861	Quin, Lord George. 15, *Belgrave-square, S.W.*
1862	Quin, John Thos., Esq. *Metropolitan Training College, Highbury-park, North, N.*
1854	*Quin, Rear-Admiral Michael. *Senior U.S. Club, S.W.; and* 18, *Albion-villas, Albion-road, Islington, N.*

Year of Election.	
1858	*Radstock, Graville Augustus, Lord. 30, *Bryanston-square, W.*
1862	*Rae, James, Esq. 32, *Phillimore-gardens, Kensington, W.*
1853	Rae, John, Esq., M.D. 4, *Fenchurch-street, E.C.; Canada; and* 4, *Belgrave-road, Eccleston-square, S.W.*
1862	Ramsay, George D., Esq. *War Office, S.W.*
1851	*Ramsay, Rear-Admiral Wm., C.B., F.R.A.S. *Junior U.S. Club, S.W.; and* 23, *Ainslie-place, Edinburgh.*
1864	Ranyard, A. C., Esq. 13, *Hunter-street, W.C.*
1862	1460 Rasch, F., Esq. 30, *Cambridge-square, Hyde-park, W.*
1859	Ratcliff, Charles, Esq., F.S.A. *National Club, S.W.; Edgbaston, Birmingham; and Downing College, Cambridge.*
1861	Rate, Lachlan Macintosh, Esq. 9, *South Audley-street, W.*
1846	Ravenshaw, E. C., Esq., M.R.A.S. *Oriental Club, W.; and* 36, *Eaton-sq., W.*
1859	Ravenstein, Ernest G., Esq. *Topographical Depôt, Spring-gardens, S.W.*
1861	Rawlinson, Sir Christopher. *United University Club, S.W.; and East Titherley-park, Stockbridge, Hants.*
1844	*Rawlinson, Maj.-General Sir Henry C., K.C.B., D.C.L., F.R.S. *Athenæum Club, S.W.; and* 1, *Hill-street, Berkeley-square, W.*
1838	Rawson, His Excellency Rawson Wm., C.B., Colonial Secretary. *Bahamas.*
1863	Reade, W. Winwoode, Esq. *Conservative Club.*
1857	Reed, William, Esq. *Oak-lodge, Addison-road, Kensington, W.*
1861	1470 *Reid, David, Esq. 57, *Jermyn-street, S.W.*
1858	Rees, L. E. R., Esq. *India.*
1859	Reeve, John, Esq. *Conservative Club, S.W.*
1863	Reeves, H. W., Esq. 13, *Regency-square, Brighton; and* 25, *Southwick-crescent.*
1856	Reid, Henry Stewart, Esq. *Bengal Civil Service.*
1857	Reid, Lestock R., Esq. *Athenæum Club, S.W.; and* 122, *Westbourne-ter., W.*
1861	Reid, William, Esq., C.E. 27, *Chalcot-villas, Haverstock-hill, N.W.*
1861	Reilly, Anthony Adams, Esq. *Belmont, Mullingar.*
1830	*Rennie, George, Esq., C.E., F.R.S., Hon. M.R.I.A. 4, *Prince's-terrace, Prince's-gate.*
1830	*Rennie, Sir John, C.E., F.R.S., F.S.A. 32, *Charing-cross.*
1834	1480 *Rennie, M. B., Esq., C.E. 22, *Portman-street, Portman-square, W.*
1864	Rennie, W., Esq. 14, *Hyde-park-square. W.*
1830	*Renouard, Rev. George Cecil, B.D., M.R.A.S. *Swanscombe-rectory, near Dartford.*
1830	*Renwick, Lieutenant, R.E.
1861	Reuter, Julius, Esq. 1, *Royal Exchange-buildings, E.C.*
1858	Reynardson, Henry Birch, Esq. *Adwell, near Tetsworth, Oxfordshire.*
1857	Richards, Capt. George H., R.N. *Hydrographer to the Admiralty, S.W.; and Torpoint, Cornwall.*
1860	Richards, the Rev. George, D.D. *Streatham, S.*
1864	Richardson, F., Esq. *Park-lodge, Blackheath-park.*
1830	*Richardson, Sir John, R.N., M.D., C.B., F.R.S. *Lancrigg, Grasmere, Westmoreland.*
1862	1490 Richardson, Mark, Esq., late Beng. Med. Staff. 95, *Inverness-terrace, W.*

Year of Election.	
1863	Rickard, Major F. I., Government Inspector of Mines, Argentine Republic. 1, *George-street, Mansion-house, E.C.*
1859	Rickards, Edward Henry, Esq. *Drayton-house, West Drayton, Middlesex.*
1862	Riddell, Henry P. A. Buchanan, Esq. *The Palace, Maidstone, Kent.*
1864	Ridley, F. H., Esq. 19, *Blomfield-road, Maida-hill, W.*
1864	Ridley, George, Esq. 2, *Charles-street, Berkeley-square, W.*
1862	*Rigby, Col. Christopher Palmer, C.B., H.M.B. Consul, *Zanzibar; and Oriental Club, W.*
1862	Rigby, Joseph D., Esq. *Kew-green, Surrey, W.*
1860	Rintoul, Robert, Esq. *Windham Club, S.W.*
1863	Ritchie, John, Esq. 22, *Blessington-road, Lee, Kent.*
1830	1500*Robe, Maj.-General Fred. Holt, C.B. *U. S. Club, S.W.; and* 5, *Palace-gardens-terrace, Kensington, W.*
1862	Roberts, Arthur, Esq. *Ormond-house*, A, *Old Kent-road, S.E.*
1864	Roberts, R. W., Esq., B.A. *Treval, Torpoint, Cornwall.*
1861	Roberts, Capt. E. Wynne. *The Knowle, Red-hill.*
1860	Robertson, D. Brooke, Esq., H.B.M.'s Consul. *Canton.*
1861	*Robertson, Graham Moore, Esq. 21, *Cleveland-square, Hyde-park, W.*
1863	Robertson, R. B., Esq. *H.M's. Legation, Yokahama, Japan.*
1853	Robinson, Albert, Esq., C.E. 35, *Great George-street, Westminster, S.W.*
1860	Robinson, Benjamin Coulson, Esq. 8, *King's-bench-walk, Temple, E.C.; and* 43, *Mecklenburg-square, W.C.*
1830	*Robinson, R.-Adml. Charles G., R.N. *Park-cottage, St. Mary's-terr., Maida-hill.*
1859	1510Robinson, Capt. D. G. *Staff of the Great Trigonometrical Survey, Rawul Pindé, Punjab.*
1863	Robinson, Geo. M., Esq. 5, *Paragon, Southwark, S.*
1864	Robinson, H. D., Esq. 12, *Leadenhall-street, E.C.*
1859	Robinson, Sir Hercules G. P. *Governor of Hong-Kong.*
1862	Robinson, Lieut.-Col. Sir John Stephen, Bart. *Rokeby-hall, Dunleer, Ireland; Arthur's Club, S.W.; and* 16A, *Park-lane, W.*
1864	Robinson, John, Esq. *Natal.*
1855	Robinson, Thos. Fleming, Esq., F.L.S. 2, *Horatio-terrace, Ormond-road, Old Kent-road, S.E.*
1850	*Robinson, Walter F., Esq., Commander R.N. 2, *Camden-crescent.*
1856	Roche, Antonin, Esq. *Educational Institute, Cadogan-gardens, Sloane-st., S.W.*
1830	*Rodd, James Rennell, Esq. 40, *Wimpole-street, W.*
1860	1520Roe, John Septimus, Esq., Surveyor-General, Western Australia; *and Messrs. Stilwell, Arundel-street, Strand, W.C.*
1860	Rogers, Henry Darwin, Esq. *Professor of Natural History, College, Glasgow.*
1863	Rogers, John T., Esq. *River-hill, Sevenoaks, Kent.*
1830	*Roget, Peter M., Esq., M.D., F.R.S. 18, *Upper Bedford-place, Russell-sq., W.C.*
1861	Rokeby, Lieut. Langham, R.M. *Conservative Club, S.W.; and R. M. Barracks, Chatham.*
1861	Rollo, Lord. 18, *Upper Hyde-park-gardens, W.; and Dumcrieff-castle, Moffat, N.B.*
1863	Rönn, M. Herman von. 77, *Addison-gardens, Kensington, W.*

Year of Election.	
1834	*Rose, the Right Hon. Sir George, F.R.S., LL.D. 4, *Hyde-park-gardens, W.; and 25, Southampton-buildings, Chancery-lane, W.C.*
1861	Rose, Jas. Anderson, Esq. *Wandsworth, Surrey, S.W.; and* 11, *Salisbury-st., W.C.*
1857	*Rose, Wm. A., Esq., Alderman. 63, *Upper Thames-street, E.C.; and Befions, Crawford.*
1864	1530 Ross, B. R., Esq.
1857	Ross, John, Esq., M.A. 2, *Brabant-court, Philpot-lane, E.C.*
1863	Ross, Wm. Andrew, Esq. 7, *Albemarle-street, W.*
1844	*Rosse, William, Earl of, M.A., F.R.S. *Birrcastle, Parsonstown, King's County, Ireland.*
1864	*Roundell, C. S., Esq. 54, *Davies-steeet, Berkeley-square, W.*
1862	Roupell, Robert Priolo, Esq., M.A., Q.C. 13, *Park-lane, W.*
1839	*Rous, Vice-Admiral the Hon. Henry John. 13, *Berkeley-square, W.*
1864	Routh, E. J., Esq. *St. Peter's College, Cambridge.*
1862	Rowe, Sir Joshua, C.B., late Chief Justice of Jamaica. 10, *Queen Anne-street, Cavendish-square, W.*
1863	Rowley, Commr. C. C. 48, *Onslow-square.*
1856	1540 Rucker, J. Anthony, Esq. *Blackheath, S.E.*
1861	*Rumbold, Charles James Augustus, Esq. *Downing College, Cambridge; and* 5, *Percival-terrace, Brighton.*
1861	Rumbold, Thomas Henry, Esq. 1, *Eccleston-square, S.W.*
1860	Rumley, Major-General Randall, V.P. Council of Military Education. 12, *Cadogan-place, S.W.*
1858	*Russell, Arthur John Edward, Esq., M.P. 2, *Audley-square, W.*
1830	*Russell, Jesse Watts, Esq., D.C.L., F.R.S.
1830	Russell, John, Earl, F.R.S. 37, *Chesham-place, S.W.; Pembroke-lodge, Richmond, S.W.; Endsleigh-ho., Devon; and Gart-ho., near Callandar, N.B.*
1860	Russell, Wm. Howard, Esq., LL.D. 18, *Sumner-place, Onslow-square, S.W.*
1860	Rutherford, John, Esq. 2, *Cavendish-place, Cavendish-square, W.*
1857	*Ryder, Capt. Alfred P., R.N. *U.S. Club, S.W.; and Launde-abbey, Uppingham.*
1864	1550 Ryder, G., Esq. 5, *Tanfield-court, Temple, E.C.*
1852	Sabine, Major-General Edw., R.A., Pres. R.S., F.R.A.S., &c. &c. 13, *Ashley-place, Victoria-street, Westminster, S.W.; and Woolwich, S.E.*
1847	St. Asaph, Rt. Rev. Thos. Vowler Short, Bishop of. *Palace, St. Asaph, N. Wales.*
1857	St. David's, Connop Thirlwall, Bishop of. *Abergwlly-palace, Carmarthen.*
1863	St. George, Maj.-Gen. J. 17, *Rutland-gate, S.W.*
1863	St. John R. H. St. Andrew, Esq., 60th Rifles.
1862	St. John, Spenser, Esq., Chargé d'Affaires, Port-au-Prince, Haiti. 28, *Grove-end-road, St. John's-wood, N.W.*
1857	St. Vincent, Edward, Viscount. *Meaford, Stone, Staffordshire.*
1863	Sale, Lieut., M.T., R.E. *Rugby.*
1845	*Salomons, David, Esq., M.P., Alderman, F.R.A.S. 3, *Great Cumberland-place, Hyde-park, W.; and Broom-hill, near Tunbridge-wells.*

Year of Election.		
1863	1560	*Salt, Henry, Esq. 29, *Gordon-square, W.C.*
1861		Salting, William Levering, Esq. 13, *King's Bench-walk, Temple, E.C.*
1861		*Sandbach, Wm. Robertson, Esq. 10, *Prince's-gate, Hyde-park, S.W.*
1862		Sanford, Major Henry Ayshford. 26, *Grosvenor-place, W.; and Nynehead-court, Wellington, Somerset.*
1863		Santos, Le Chev. G. dos. 12, *Gloucester-place, Portman-square, W.*
1860		Sarel, Lt.-Col. H. A., 17th Lancers. *Army and Navy Club, S.W.; and Shanghae.*
1862		Sargood, F. J., Esq. *Moorgate-street-buildings, E.C.*
1860		Sartoris, Alfred, Esq. 64, *Rutland-gate, S.W.*
1852		Saumarez, Captain Thomas, R.N. *Army and Navy Club, S.W.; and Millhook-house, Jersey.*
1864		Saurin, Admiral E. *Prince's-gate, S.W.*
1863	1570	Sawyer, Col. Charles, 6th Dragoon Guards. *Heywood-lodge, Maidenhead.*
1863		Sayer, Captain Frederick. *Gibraltar; and Manor-house, Richmond, S.*
1838		Scarlett, Lieut.-General the Hon. Sir J. Yorke, K.C.B. *Portsmouth.*
1861		Schenley, Edward W. H., Esq. 14, *Prince's-gate, S.W.*
1859		Scott, Lord Henry. 37, *Belgrave-square, S.W.*
1861		*Scott, Hercules, Esq. *Brotherton, near Montrose, N.B.*
1855		Scott, Vice-Admiral Sir James, K.C.B. *United Service Club, S.W.*
1864		Scott, John, Esq. 3, *Chester-place, Hyde-park, W.*
1863		Scovell, George, Esq. 34, *Grosvenor-place, S.W.*
1840		*Scrivener, J. F. P., Esq. 20, *Bryanston-square, W.; and Ramridge-house, near Andover, Hants.*
1861	1580	Searight, James, Esq. *Bedford-hill, Balham, S.*
1830		*Sedgwick, the Rev. A., Woodwardian Lecturer, M.A., F.R.S. *Athenæum Club, S.W.; and Cambridge.*
1862		Seemann, Berthold, Esq., PH. DR., F.L.S. 22, *Canonbury-square, N.*
1858		*Serocold, Charles P., Esq. *Brewery, Liquorpond-street, E.C.*
1853		Sevin, Charles, Esq. 155, *Fenchurch-street, E.C.*
1853		Sewell, Henry, Esq. 58, *Old Broad-st., E.C.; and Stamford-hill, N.*
1858		Seymour, George, Esq. 17, *Gracechurch-street, E.C.; and 12, Sussex-square, Hyde-park, W.*
1855		Seymour, Admiral Sir Geo. F., K.C.B., G.C.H. 115, *Eaton-square, S.W.*
1853		*Seymour, Henry Danby, Esq., M.P. *Brooks's Club, St. James's-street, S.W.; Knoley-Hindon, Wilts; and Glastonbury, Somersetshire.*
1854		*Shadwell, Captain Charles F. A., R.N., C.B. *Slough.*
1860	1590	*Shadwell, Lieut.-Col. Lawrence, C.B. 91, *Plymouth-grove, Manchester.*
1861		Shaffner, Col. Taliaferro P., U.S. 62, *Moorgate-street, E.C.; 49, Weymouth-street, Portland-place, W.; and Louisville, Kentucky, U.S.*
1856		*Share, James Masters, Esq., R.N. *H.M.S. 'Calcutta,' East Indies; and Front-street, Tynemouth, Northumberland.*
1861		Sharp, Peter, Esq. *Oakfield, Ealing, W.*
1861		*Sharpe, William John, Esq. 1, *Victoria-street, Westminster, S.W.; and Norwood, Surrey, S.*
1862		*Shaw, John, Esq. *Finegand, Otago, New Zealand.*

Year of Election.	
1861	Shaw, John Ralph, Esq. *Sand-hey, Hoylelake, Birkenhead.*
1858	Shea, John, Esq., M.D., Surgeon R.N. 84, *Blackfriars-road, S.*
1846	Sheffield, George A. F. C., Earl of. 20, *Portland-pl., W.; and Sheffield-pk., Sussex.*
1857	Sheil, Major-Gen. Sir Justin, K.C.B. 13, *Eaton-place, Belgrave-square, S. W.*
1861	1600 Shephard, Chas. Douglas, Esq., Surg. R.N. *Harewood-hall, near Cheadle, Staffords.*
1861	Shepherd, Rev. Edward John, M.A. *Trottersclifffe, Kent.*
1860	Sherer, John, Esq.
1860	Sheridan, H. Brinsley, Esq., M.P. *Bellefield-house, Parson's-green, Fulham, S. W.*
1863	Sheridan, Richd. B., Esq., M.P. 48, *Grosvenor-place, S. W.*
1857	Sherrin, Joseph Samuel, Esq., LL.D., PH. DR. *Leyton-house, Leyton-crescent, Kentish-town, N. W.*
1859	*Sherwill, Lt.-Col. W. S., F.G.S. *Prof. of Surveying, Civil Engr. College, Calcutta; and Perth, N.B.*
1858	*Shipley, Conway M., Esq. *Army and Navy Club, S. W.; and Raheny, Dublin.*
1862	Showers, Lieut.-Col. Charles S. *Cox's-hotel, Jermyn-street, S. W.*
1856	Shuttleworth, Sir J. P. Kay, Bart. 38, *Gloucester-square, W.; and Gawthorp-hall, Burnley, Lancashire.*
1859	1610 Silver, the Rev. Fred., M.A., F.R.A.S. *Norton-rectory, Market Drayton, Salop.*
1859	*Silver, Stephen Wm., Esq. 66, *Cornhill, E.C.; and Norwood-lodge, Lower Norwood, S.*
1853	Silver, William, Esq., M.A., Barrister-at-Law. *Bessborough-street, S. W.*
1859	Sim, Captain Charles, R.E., Surveyor-General, Ceylon.
1860	Sim, John Coysgame, Esq. 13, *Victoria-street, Westminster, S. W.*
1853	Simmons, Edward R., Esq., Barrister-at-Law. *Ellerslie, Chichester.*
1848	Simmons, Colonel John L. A., R.E., C.B. *H. B. M.'s Consul, Warsaw; United Service Club, S. W.*
1853	Simpkinson, Lieut. Francis G., R.N. 55, *Victoria-street, Westminster, S. W.*
1864	Simpson, Frank, Esq. 17, *Whitehall-place.*
1862	Simpson, Henry Bridgeman, Esq. 44, *Upper Grosvenor-street, W.*
1861	1620 Simpson, James, Esq., C.E., F.G.S. 29, *Great George-street, Westminster, S. W.*
1863	*Simpson, Wm., Esq. 64, *Lincoln's-inn-fields, W.C.*
1857	Sitwell, Major W. H. *Junior United Service Club, S. W.*
1858	Skelmersdale, Edward, Lord. *Lattom-park, Ormskirk, Lancashire.*
1863	Skrine, Hy. D., Esq. *Warleigh-manor, near Bath.*
1862	Skinner, Russell Morland, Esq. 8, *Westborne-crescent, Hyde-park, W.*
1861	Sladen, Rev. Edward Henry Mainwaring. *Alton, near Marlborough, Wilts.*
1861	Sligo, G. J. Browne, Marquis of. 14, *Mansfield-st., W.; and Westport, Co. Mayo.*
1860	*Smith, Augustus Henry, Esq. *Bron Ceris, Carnarvon, North Wales.*
1855	Smith, Rev. Brownrigg, M.A. *Shepherd-lane, Brixton, S.*
1859	1630 Smith, Edward, Esq. *Dublin Castle.*
1853	Smith, George, Esq. *Peru.*
1857	Smith, George R., Esq. 73, *Eaton-square, S. W.; and Telsden-park, Surrey.*
1861	Smith, H. S. Dazley, Esq., M.A. *United University Club, S. W.*
1857	*Smith, Horace, Esq. *Broxbourne-borough, Hoddesdon.*

Year of Election.	
1830	*Smith, James, Esq., F.R.S.L. & E. *Athenæum Club, S.W.; & Jordan-hill, Glasgow.*
1861	Smith, Jervoise, Esq. 47, *Belgrave-square, S.W.*
1854	Smith, John, Esq., Memb. Geograph. Soc. Bombay. 27, *Prince's-gate, S.W.*
1853	Smith, John Harrison, Esq. 49, *Inverness-terrace, W.*
1853	Smith, John Henry, Esq. 1, *Lombard-street, E.C.; and Purley, Croydon, Surrey.*
1861	1640 Smith, J. Sidney, Esq., Barrister-at-Law. *Sidney-lodge, Wimbledon-common, S.W.*
1861	*Smith, Joseph Travers, Esq. 25, *Throgmorton-street, E.C.*
1838	*Smith, Octavius Henry, Esq. *Thames-bank, Westminster, S.W.*
1857	Smith, Captain Philip, Grenadier Guards.
1841	*Smith, Thomas, Esq.
1860	Smith, William, Esq., C.E. 19, *Salisbury-street, Strand, W.C.*
1859	*Smith, W. Castle, Esq. 1, *Gloucester-terrace, Regent's-park, N.W.*
1857	Smith, Wm. Gregory, Esq. *Hudson-bay Company, Fenchurch-street, E.C.*
1859	Smith, William Henry, Esq. 1, *Hyde-park-street, W.*
1837	*Smyth, Rear-Adm. William, R.N. *Richmond-house, Ryde, Isle of Wight.*
1830	1650 *Smyth, Vice-Admiral William Henry, K.S.F., D.C.L., F.R.S., V.P.S.A., F.R.A.S., Hon. M.R.I.A., Corr. Inst. Fr., &c. &c. *Athenæum Club, S.W.; and St. John's-lodge, near Aylesbury, Bucks.*
1850	*Smythe, Colonel William J., R.A.
1863	Snowden, Francis, Esq., M.A. 1, *Dr. Johnson's-buildings, Temple, E.C.*
1861	Soldan, Don Marino Felipe Paz. *Lima; and* 21A, *Hanover-square, W.*
1839	*Somers, Charles, Earl. 33, *Prince's-gate, S.W.; Eastnor-castle, Herefordshire; and The Priory, Reigate, Surrey.*
1862	Somerset, Capt. Leveson E. H., R.N. *Southgate, near Leighton-Buzzard.*
1858	*Somes, Joseph, Esq., M.P. *Fortismere, Muswell-hill, N.*
1855	Sopwith, Thomas, Esq., M.A., C.E., F.R.S. 103, *Victoria-street, Westminster.*
1845	*Sotheby, Lt.-Col. Fred. S., C.B., F.R.A.S. 3, *Portugal-street, Grosvenor-sq., W.*
1861	South, John Flint, Esq. *St. Thomas's Hospital, S.E.; and Blackheath-park, S.E.*
1860	1660 Southesk, James Carnegie, Earl of. *Kinnaird-castle, Brechin, N.B.*
1853	Southey, Henry Sedgfield, Esq., Barrister-at-Law. *Athenæum Club, S.W.*
1860	*Southey, Jas. Lowther, Esq. *Leacroft, Hurstpierpoint, Sussex.*
1863	Spickernell, Dr. Geo. E., Principal of Eastman's Royal Naval Establishment. *Eastern-parade, Southsea.*
1861	Spofforth, Markham, Esq. 3, *Porchester-terrace, W.*
1830	*Spottiswoode, A., Esq. 12 *James-street, Buckingham-gate.*
1855	*Spottiswoode, William, Esq., F.R.S. 50, *Grosvenor-place, S.W.*
1859	*Spratt, Capt. Thos. A. B., R.N., C.B. *Mount Ephraim, Tunbridge-wells, Kent.*
1857	Spring-Rice, Hon. S. E. (Deputy-Chairman of the Board of Customs). *Mount Trenchard, Foynes, Ireland.*
1859	Stafford, Edward W., Esq. *Colonial Secretary of New Zealand.*
1853	1670 Stanford, Edward, Esq. 6, *Charing-cross, S.W.*
1855	Stanhope, Philip Henry, Earl, Pres. Soc. of Antiquaries. 3, *Grosvenor-place-houses, Grosvenor-place, S.W.; and Chevening, Sevenoaks, Kent.*
1860	*Stanhope, Walter Spencer, Esq. *Cannon-hall, Barnsley, Yorkshire.*

Year of Election.		
1856		Staniland, William, Esq., C.E. *The Crescent, Selby, Yorkshire.*
1856		Stanley, Edmund Hill, Esq. *Craven-hotel, Strand, W.C.*
1853		*Stanley, Edward Henry, Lord, M.P., D.C.L. 23, *St. James's-square, S.W.*
1863		Stanton, Geo., Esq. *Coton-hill, Shrewsbury; and Conservative Club, S.W.*
1856		Statham, John Lee, Esq. 60, *Wimpole-street, W.*
1863		*Staveley, Miles, Esq. *Old Sleningford-hall, Ripon.*
1858		Staveley, Thos. G., Esq. *Foreign Office; and* 24, *Cambridge-st., Hyde-park, W.*
1850	1680	Steele, Colonel Thomas M., C.B., Coldstream Guards. 36, *Chester-square, S.W.*
1830		*Stephen, Sir George. *Melbourne.*
1857		Stephenson, Sir R. Macdonald, C.E. 6, *Upper Hyde-park-gardens, W.; and East-cottage, Worthing.*
1860		Sterling, Col. Sir Anthony. *The White Cottage, South-pl., Knightsbridge, W.*
1862		Sterry, Henry, Esq. 7, *Paragon, Southwark, S.E.*
1854		Stevens, Frederic Perkins, Esq. *Melbourne, Australia.*
1855		Stevens, Henry, Esq., F.S.A. 4, *Trafalgar-square, Charing-cross, W.C.*
1841		Stevenson, Thomas, Esq., F.S.A. 37, *Upper Grosvenor-street, W.*
1861		Stewart, Alex. Jas. Robt., Esq. 12, *Belgrave-square, S.W.; and Ards-house, Donegal.*
1860		*Stewart, Major J. H. M. Shaw, Royal Madras Engineers. *Creebridge-house, Newtown-Stewart, N.B.*
1860	1690	Stewart, Major Patric, Bengal Engineers.
1860		Stirling, Capt. Frederick Henry, R.N. *H. M. S. 'Hero.'*
1841		Stirling, Vice-Admiral Sir James. *United Service Club, S.W.*
1860		*Stirling, William, Esq., M.P. 128, *Park-st., Grosvenor-sq., W.*
1860		Stirling, Sir Walter, Bart. 36, *Portman-square, W.*
1860		Stocker, John Palmer, Esq. 93, *Oxford-terrace, Hyde-park, W.*
1845		*Stokes, Rear-Admiral John Lort, R.N. *U.S. Club, S.W.; and Scotchwell, Haverfordwest, Wales.*
1858		Stopford, James Sydney, Esq. 18, *Savile-row, W.*
1861		Stracey, Sir Henry, Bart., M.P. 39, *Dover-street, Piccadilly, W.*
1861		Strange, Lieut.-Col. Alexander. 41, *Brompton-crescent, S.W.*
1858	1700	Strangford, Percy Ellen, Viscount. 58, *Cumberland-street, W.*
1858		Stratford de Redcliffe, Stratford Canning, Viscount. 29, *Grosvenor-square, W.*
1860		Stratheden and Campbell, Wm. F. Campbell, Lord. *Stratheden-house, Knightsbridge, S.W.*
1864		Straton, N. D. J., Esq. *Aylestone, Leicester.*
1860		Strickland, Edward, Commissary-General. *Barbadoes, W. Indies.*
1853		Strutt, George H., Esq., F.R.A.S.
1858		Strutt, Captain Hammel Ingold. *Examiner Royal Mail Steam Company, Southampton.*
1859		*Strutt, Captain William. 26, *Richmond-place, Southampton.*
1853		*Strzelecki, Count P. E. de, C.B., F.R.S. 20*b*, *Savile-row, W.*
1859		Stuart, Lieut.-Col. J. F. Dudley Crichton, M.P., Grenadier Guards. 28, *Charles-street, St. James's, S.W.*

Year of Election.	
1861	1710 Stuart, Vice-Chancellor Sir John. 11 *and* 12, *Old-buildings, Lincoln's-inn, W.C.; 5, Queen's-gate, Hyde-park, W.; and Grushernish, Isle of Skye, Invernesshire.*
1834	*Sturge, Thomas, Esq. *Northfleet, Kent.*
1833	Sturt, Capt. Charles, F.L.S. *St. Edmond's, Tivoli, Cheltenham.*
1862	Stutfield, William, Esq. 15, *Leinster-terrace, Hyde-park, W.; and Mystoke-park, Canterbury.*
1858	Sudeley, Lord.
1857	Sulivan, Captain Bartholomew J., R.N., C.B. *Board of Trade, S.W.*
1860	Sullivan, John W., Esq. 11, *Home-park, Stoke, Devonport.*
1862	Surridge, Henry Arthur Dillon, Esq., B.A. 31, *Lower Grosvenor-street, W.*
1862	Surtees, Capt. Charles Freville. *Chalcott-house, Long Ditton, Surrey.*
1861	*Sutherland, George Granville William, Duke of. *Stafford-house, St. James's Palace, S.W.*
1856	1720 Sutherland, Kenneth L., Esq., Paymaster R.N., Barrister. *Junr. U.S. Club, S.W. Chesterfield-house, Weymouth; and the Royal Yacht, Portsmouth.*
1840	*Sutherland, Robert, Esq. *Carmona, Bank, Dunoon, Argyleshire.*
1864	Swamy, Mutu C., Esq. *Athenæum Club.*
1857	Swanzy, Andrew, Esq. 38, *Cannon-street, E.C.*
1857	*Sweeting, Robert, Esq. 32, *Nicholas-lane, Lombard-street, E.C.; and London-hill, Harrow.*
1836	*Swinburne, Rear-Admiral Charles H. 18, *Grosvenor-place, W.; and Capheaton, near Newcastle-upon-Tyne.*
1862	*Swinburne, Lieut. Sir John, Bart., R.N. *Capheaton, Newcastle-on-Tyne.*
1863	Swinhoe, Robert, Esq., H.B.M. Consul, Formosa. 18, *Royal Avenue-terrace, Chelsea, W.*
1859	Sykes, Christopher, Esq. *Sledmere, Malton.*
1851	Sykes, Colonel William Henry, M.P., F.R.S., Hon. M.R.I.A. *Athenæum Club, S.W.; and 47, Albion-street, Hyde-park, W.*
1864	1730 Symonds, F., Esq., M.D. *Beaumont-street, Oxford.*
1852	*Synge, Col. Millington H., R.E.
1852	Tagart, Courtenay, Esq. *Reform Club, S.W.; and Paris.*
1859	Tagart, Francis, Esq. 31, *Craven-hill-gardens, Hyde-park, W.*
1864	Tait, P. M., Esq. 162, *Adelaide-road, N.; and Oriental Club.*
1857	*Tait, Robert, Esq. 14, *Queen Anne-street, W.*
1861	Talbot de Malahide, Lord. *Malahide Castle, Co. Dublin.*
1861	Tayler, Joseph Walter, Esq. 1, *Oak-villas, Acton, Middlesex, W.*
1861	Taylor, Lieut. A. Dundas, I.N. 6, *Nightingale-road, Lower Clapton, N.E.*
1854	*Taylor, John Stopford, Esq., M.D. 1, *Springfield, St. Anne-street, Liverpool.*
1863	1740 Taylor, John, Esq. 1, *Leadenhall-street, E.C.; and Egremont-villa, Lower Norwood, Surrey, S.*
1863	Taylor, John, Esq. *Adelaide, Australia.*

Year of Election.	
1863	Taylor, Col. R. C. H. *Sandgate; and Carlton Club, S. W.*
1864	Taylor, W. R., Esq. *Netley.*
1857	Teesdale, John M., Esq. *Downage-house, Hendon, N.W.*
1863	Tegg, Wm., Esq. 13, *Doughty-street, Mecklenburg-square, W.C.*
1860	Templeton, John, Esq. 24, *Budge-row, E.C.*
1857	Tennant, Professor James. 149, *Strand, W.C.*
1859	Tennant, Major J. F., Bengal Engrs. *Director of the Observatory, Madras.*
1830	*Thatcher, Colonel, E.I.C.
1865	1750 Theed, William F., Esq. *Campden-lodge, Kensington, W.*
1861	Theobald, James, Esq., M.A. *R. T. Yacht Club, Albemarle-street, W.; and Grays, Essex.*
1863	Thomas, G., Esq. *Queen's-gardens-terrace, Hyde-park, W.*
1854	Thomas, Henry Harrington, Esq. *Lansdowne-crescent, Bath.*
1864	Thomas, J. R., Esq., Staff Assist. Surg. *Castle-hill, Fishguard, Pembrokeshire.*
1859	Thompson, Thomas A., Esq.
1854	Thompson, William C., Esq.
1863	Thomson, James, Esq. *Motcombe-house, East Moulsey.*
1863	Thomson, James Duncan, Esq., Portuguese Consul. *St. Peter's Chambers, Cornhill, E.C.*
1848	*Thomson, J. Turnbull, Esq. *Chief Surveyor, Otago, New Zealand.*
1861	1760 *Thomson, Ronald Ferguson, Esq., 1st Attaché to the Persian Mission. *Clifford-inn, Fleet-street, E.C.*
1854	*Thomson, Thomas, Esq., M.D. *Hope-house, Kew, W.*
1865	Thomson, W. T., Esq. 21, *James-street, Buckingham-gate, S.W.*
1862	*Thorne, Augustus, Esq. 4, *Cullum-street, City, E.C.*
1847	Thornton, Rev. Thomas Cooke, M.A., M.R.I. *Brock-hall, near Weedon, Northamptonshire.*
1858	Thorold, Rev. A. W. 16, *Bedford-square, W.C.*
1854	Thorold, Henry, Esq. *Cuxwold, Lincolnshire.*
1861	Thrupp, John, Esq.
1859	Thuillier, Lt.-Colonel H. L., Surveyor-General of India. *Calcutta.*
1861	Thurburn, Capt. Henry. 5, *Queensborough-terrace, Bayswater, W.*
1864	1770 *Thurburn, Hugh, Esq. 108, *Westbourne-terrace, W.*
1861	Thurlow, the Hon. Thos. J. Hovell. *British Embassy, Paris.*
1846	*Tindal, Charles John, Esq. *New South Wales.*
1839	*Tinne, John A., Esq. *Briarley, Aigburth, near Liverpool.*
1862	Todd, John, Esq. *Sydney.*
1853	*Tomlin, George Taddy, Esq., F.S.A. *Combe-house, Bartonfields, Canterbury; and Windham Club, S.W.*
1853	Tomline, George, Esq., M.P. 1, *Carlton-house-terrace, S.W.*
1835	*Tooke, Arthur Wm., Esq., M.A. *Pinner-hill-house, near Watford, Middlesex.*
1864	Tottenham, Rev. John W., B.A. *Quarry-villa, St. Leonard's-on-sea, Sussex.*
1856	Torrance, John, Esq. 5, *Chester-place, Hyde-park-square, W.*
1859	1780 Townsend, John, Esq., Lieut. R.N. *Lona, Weston-super-Mare.*

Year of Election.	
1846	*Towry, George Edward, Esq.
1858	Towson, J. Thomas, Esq. *Secretary Local Marine Board, Liverpool.*
1864	*Toynbee, Capt. Hy. *Commanding the East-India Ship 'Hotspur.'*
1863	*Tozer, Rev. H. F., M.A. *Exeter College, Oxford.*
1864	Tracy, the Hon. C. H. 11, *George's-street, W.*
1861	Train, George Francis, Esq.
1863	*Travers, Arch., Esq. 4, *College-villas, Finchley-new-road, N. W.*
1862	Travers, Franklin, Esq. *Cavendish Club, W.*
1860	Travers, John Ingram, Esq. 19, *Swithin's-lane, E.C.*
1859	1790 Tremlett, Rev. Francis W., M.A. *Belsize-park, Hampstead, N. W.*
1863	Trestrail, Rev. Frederick. *Stanmore-villa, Beulah-hill, Upper Norwood, S.*
1862	Trevelyan, Sir Charles Edward, K.C.B. 8, *Grosvenor-crescent, S. W.*
1830	Trevelyan, Sir Walter Calverly, Bart., M.A., F.S.A., F.L.S., F.R.S.E.A., &c. *Athenæum Club, S. W.; Wallington, Northumberland; and Nettlecombe, Somerset.*
1860	Trigg, John Davies, Esq. *Magdalen Hall, Oxford.*
1864	Trimmer, Edmund, Esq. *Care of Messrs. Trimmer and Co., New City-chambers, Bishopsgate-street.*
1858	Trotter, Alexander, Esq. *Devonshire-place-house, New-road, N. W.*
1862	Tuckett, Francis Fox, Esq. *Frenchay, near Bristol.*
1835	*Tuckett, Frederick, Esq. 4, *Mortimer-street, Cavendish-square, W.*
1852	Tudor, Edward Owen, Esq., F.S.A. 46, *Westbourne-terrace, W.*
1857	1800 Tudor, Henry, Esq. 46, *Westbourné-terrace, W.*
1862	Tuke, Harrington, Esq., M.D. 37, *Albemarle-street, W.*
1864	Turnbull, George, Esq., C.E., F.R.A.S. 39, *Craven-hill-gardens, W.*
1834	*Turnbull, Rev. Thomas Smith, F.R.S. *University Club, S. W.; and Blofield, Norfolk.*
1863	Turner, Thos., Esq. *Guy's Hospital, Southwark, S.*
1864	*Twentyman, A. C., Esq. *Tettenhall-wood, near Wolverhampton.*
1863	Twentyman, Wm. H., Esq. *Manor-house, St. John's-wood, N. W.*
1863	*Twiselton, Hon. E. F. *Rutland-gate, S. W.*
1849	Twiss, Travers, Esq., D.C.L., F.R.S. 19, *Park-lane, W.*
1858	Twyford, Capt. A. W., 21st Hussars. 108, *Cambridge-st., Warwick-sq., S. W. Cavalry Depôt, Canterbury; Reform Club, S. W.; and Clayton Wickham, Hurstpierpoint, Sussex.*
1862	1810 Tyler, Edward Burnet, Esq. *Linden, Wellington, Somerset.*
1862	*Tyler, George, Esq. 24, *Holloway-place, Holloway-road, N.*
1859	Tytler, Capt. W. Fraser. *Aldowrie, Inverness.*
1862	Underhill, Edward Bean, Esq. 13, *Camden-square, Camden-town, N. W.*
1861	Ussher, John, Esq. *Arthur's Club, St. James's Street, S. W.*
1858	*Uzielli, Theodosius, Esq. 114, *Piccadilly, W.*
1844	*Vacher, George, Esq. *Manor-house, Teddington.*
1862	*Vander Byl, P. G., Esq. 3, *Upper Hyde-park-gardens, W.*

Year of Election.	
1845	*Vane, Lord Harry G., M.P. 1, *Grosvenor-place-houses, S.W.*
1858	Vardon, Arthur, Esq. *Worth, Crawley, Sussex.*
1857	1820 Vardon, Thomas, Esq. *Library, House of Commons, Palace, Westminster, S.W.*
1863	Varley, C. F., Esq., C.E. *Telegraph-street, E.C.*
1856	*Vaughan, James, Esq., F.R.C.S., Bombay Army. *Bombay.*
1861	Vaughan, J. D., Esq., Assist. Res. Councillor and Police Magistrate of Singapore.
1861	Vaughan, Nash Vaughan Edwards, Esq. *Rheola, near Neath; and Lanelay, near Pontyfield, Glamorganshire.*
1849	Vaux, William S. W., Esq., M.A., F.S.A. *British Museum, W.C.*
1852	*Vavasour, Sir Henry M., Bart. 8, *Upper Grosvenor-street, W.*
1855	Vavasseur, James, Esq. 2, *De Crespigny-park, Denmark-hill, S.*
1860	Verbeke, Frederick, Esq. 41, *Victoria-street, Westminster, S.W.*
1863	*Vereker, the Hon. H. P., LL.D., H.M. Consul at Rio Grande do Sul. 1, *Portman-square, W.*
1862	1830 Verner, Edward Wingfield, Esq. 86, *Eaton-square, S.W.; and Cook-abbey, Bray, Co. Wicklow.*
1862	Verney, Lieut. Edmond H., R.N. *H.M.S. 'Grappler.'*
1837	*Verney, Major Sir Harry C., Bart., M.P., F.R.A.S. *Travellers' Club, S.W.;* 32, *South-street, Grosvenor-square, W.; and Claydon-house, Bucks.*
1857	Verrey, Charles, Esq.
1852	Verulam, James Walter, Earl of. *Gorhambury, near St. Alban's; Barry-hill, Surrey; and Messing-hall, Essex.*
1859	Vesey, Arthur, Esq. *Long Ditton, Kingston, Surrey, S.W.*
1830	Vetch, Captain James, R.E., F.R.S. 48, *Finchley-road, St. John's Wood, N.W.*
1865	Vile, Thomas, Esq. 75, *Oxford-terrace, W.*
1857	Vincent, John, Esq. 4, *Granville-park, Blackheath, S.E.*
1858	Vines, William Reynolds, Esq., F.R.A.S. 4, *Thavies inn, Holborn-hill, E.C.*
1863	1840 Vivian, Major Quintus, late 8th Hussars. 17, *Chesham-street, S.W.*
1838	*Vyvyan, Sir Richard Rawlinson, Bart., F.R.S. *Trelowarren, Cornwall.*
1852	Wade, Mitchell B., Esq. 66, *South John-street, Liverpool.*
1864	Wade, R. B., Esq. 58, *Upper Seymour-street, Portman-square, W.*
1863	Wade, Thos. F., Esq., C.B., H.B.M. Secretary of Legation. *Pekin, China.*
1853	*Wagstaff, William Racster, Esq., M.D., M.A.
1863	Waite, Henry, Esq. 3, *Victoria-street, Pimlico, S.W.*
1864	Wakefield, E. T., Esq. 40, *Pembridge-villas, Bayswater, W.*
1862	Walker, Col. C. P. Beauchamp, C.B., Assist. Quartermaster-Gen., Shorncliffe. 97, *Onslow-square, S.W.; and United Service Club, S.W.*
1860	Walker, David, Esq., M.D., F.L.S., M.R.I.A. *Seacombe, Cheshire.*
1861	1850 Walker, Edward Henry, Esq., Vice-Consul at Tripoli. *Newton-bank, Chester.*
1863	*Walker, Frederick John, Esq. *Thornbury-house, Thornbury, Bristol.*
1863	Walker, James, Esq., Managing Director of Madras Railway. 16, *Norfolk-crescent, Hyde-park, W.*
1859	*Walker, Lt.-Col. James, Bombay Engineers. *Murree, near Rawul Pindi, Punjab,*

Year of Election.

1830 Walker, John, Esq., Hydrog. India Office. 9, *Castle-street, Holborn, W.C.*

1861 *Walker, John, Esq. 60, *Porchester-terrace, W.*

1858 *Walker, Captain John, H.M.'s 66th Foot. 13, *Westbourne-st., Hyde-park, W.*

1864 Walker, R. B. N., Esq. 10, *Milborne-grove, West Brompton, S.W.*

1860 Walker, Robert, Esq., M.D., Ass. Surg. R.N. *Bellefield-place, Portobello, N.B.*

1861 *Walker, T. F. W., Esq.

1853 1860 Walker, Captain William Harrison, H.C.S. 3, *Gloucester-terrace, W.; and Board of Trade, S.W.*

1861 Walker, William, Esq. *Training College, Peterborough.*

1863 Walker, Rev. William Henry, M.A. *Necton-rectory, Shipham, Norfolk.*

1854 Wallace, Alfred Russell, Esq. 5, *Westbourne-grove-terrace, W.*

1861 Wallace, Rev. Charles Hill, M.A. 3, *Harley-place, Clifton, Bristol.*

1864 Waller, Horace, Esq. *Sydenham-road, Croydon, S.*

1863 Wallich, George C., Esq., M.D. 17, *Campden-hill-road, W.*

1864 Walmsley, Joshua, Esq., Government Resident Agent. *Natal.*

1860 Walpole, Capt. the Hon. F. *Travellers' Club, S.W.; and Rainthorpe-ha Long Stratton, Norfolk.*

1863 Walpole, Rt. Hon. Spencer, M.P. *Grafton-street, W.; and Ealing, W.*

1853 1870 Walter, Henry Fraser, Esq. *Papplewick-hall, near Nottingham.*

1863 Walton, J. W., Esq. 21B, *Savile-row, W.*

1864 Walton, R. G., Esq., C.E. 3, *Adelphi-terrace, Strand, W.C.*

1853 *Ward, George, Esq.

1860 Ward, Captain J. Hamilton, R.N. *Oakfield, Wimbledon-park, S.W.*

1861 Warder, Rev. William. *Lonsdale Mission House, Berbice; and London Missionary Society, Blomfield-street, Finsbury, E.C.*

1862 Wardlaw, John, Esq. 57, *Prince's-gate, Kensington, W.*

1864 Warner, E., Esq., M.P. *Higham-hall, Woodford, Essex; and 49, Grosvenor-place, S.W.*

1859 Warre, Arthur B., Esq. 54, *Lowndes-square, S.W.*

1862 Warren, Capt. Richard Pelham. *Worting-house, Basingstoke.*

1852 1880 Watkins, John, Esq., F.R.C.S., F.S.A. 2, *Falcon-square, Aldersgate-street, E.C.*

1862 Watney, John, Esq. 16, *London-street, Fenchurch-street, E.C.*

1859 Watson, James, Esq. 24, *Endsleigh-street, W.C.*

1860 Watson, James, Esq., Barrister-at-Law. *Inner Temple; and Clifton-hall, Ratho, N.B.*

1861 Watson, John Harrison, Esq. 28, *Queensborough-terrace, Kensington-gardens, W.*

1858 Watson, Josh. John Wm., Esq., C.E., PH. DR.

1853 Watts, J. King, Esq. *St. Ives, Huntingdonshire.*

1857 *Waugh, Maj.-General Sir Andrew Scott, Bengal Engineers, F.R.S., late Surveyor-General and Superintendent Great Trig. Survey. *Athenæum Club, S.W. and 7, Petersham-terrace, Queen's-gate-gardens, South Kensington, W.*

1861 Way, Arthur, Esq., M.P. *Ashton-lodge, Ashton, near Bristol.*

1858 *Webb, Capt. Sydney. *Oriental Club, Hanover-square, W.; and 24, Manchester-square, W.*

Year of Election.		
1862	1890	*Webb, William Frederick, Esq. *Newstead-abbey.*
1836		*Webber-Smith, Colonel James, 95th Regiment. *West Ashling, Sussex.*
1858		Webster, George, Esq., M.D. *Dulwich, S.*
1864		Webster, E., Esq. *North-lodge, Ealing, W.*
1860		Weguelin, Thomas Matthias, Esq., M.P. *Peninsular and Oriental Steam Navigation Co., Moorgate-street, E.C.*
1851		Weller, Edward, Esq. 34, *Red-lion-square, W.C.*
1853		*Wellington, Arthur Richard, Duke of, Major-General, D.C.L. *Apsley-house, W.; and Strathfieldsaye, Hampshire.*
1464		Wells, Sir Mordant, late Chief Puisne Judge, Bengal. 107, *Victoria-st., S.W.*
1862		Wells, William, Esq. 22, *Bruton-street, W.; and Redleaf, Penshurst, Kent.*
1863		Welman, Chas., Esq. *Norton-manor, Taunton.*
1857	1900	West, Lieut.-Colonel J. Temple. *Benwick-lodge, Ryde, Isle of Wight.*
1861		West, Rev. W. De Lancy, M.A., Head Master, Grammar School. *Brentwood, Essex.*
1863		*Westlake, John, Esq. 16, *Oxford-square, W.*
1853		Westmacott, Arthur, Esq. *Conservative Club, St. James's-street, S.W.*
1844		*Westminster, Richard, Marquis of. 33, *Upper Grosvenor-street, W.; Eaton-hall, Cheshire; and Motcombe-house, Dorsetshire.*
1852		Weston, Alex. Anderdon, Esq., M.A. 18, *Rutland-gate, Hyde-park, S.W.*
1862		Westwood, John, Esq. 27, *Cannon-street, E.C.*
1863		Wetton, Champion, Esq. *Somerset-hill, Dorking.*
1830		*Weyland, John, Esq., F.R.S. *Woodrising-hall, Norfolk.*
1861		Wharton, Rev. J. C. *Willesden Vicarage, N.W.*
1858	1910	Wheatley, G. W., Esq. 150, *Leadenhall-street, E.C.*
1859		Wheelwright, William, Esq. *Gloucester-lodge, Regent's-park, N.W.*
1837		*Whewell, Rev. William, D.D., F.R.S., F.S.A., Vice-Chancellor, Cambridge. *Athenæum Club, S.W.; and Lodge, Cambridge.*
1853		*Whinfield, Edward Wrey, Esq., B.A. *South Elkington Vicarage, Louth.*
1837		Whinyates, Lieut.-General E. C., R.A., C.B., K.H. *Dorset-villa, Cheltenham.*
1839		*Whishaw, James, Esq., F.S.A. 16, *York-terrace, Regent's-park, N.W.*
1862		Whitby, Capt. Edward, late 3rd Dragoon Guards. 16, *Westbourne-street, Hyde-park, W.; and Cresswell-hall, Staffordshire.*
1857		White, Arthur D., Esq., M.D. 56, *Chancery-lane, W.C.*
1855		*White, Charles, Esq. 10, *Lime-st., E.C.; and Barnesfield, near Dartford, Kent.*
1857		White, Henry, Esq. 5, *Lancaster-terrace, Upper Hyde-park-gardens, W.*
1862	1920	White, Col. Henry Dalrymple, C.B. 39, *Lowndes-square, S.W.*
1862		White, James T., Esq. 20, *Cumberland-terrace, Regent's-park, N.W.*
1856		White, Robert, Esq. *Laurel-cottage, West Cowes, Isle of Wight.*
1852		White, William Foster, Esq. *Treasurer, St. Bartholomew's Hospital, E.C.*
1863		*White, Wm. O., Esq. 10, *Lime-street, E.C.; and Barnsfield, near Dartford, Kent.*
1862		Whitehouse, William Matthew Mills, Esq. 46, *Chepstow-place, Bayswater, W. and Hardwicke-house, Studley, Warwickshire.*

Year of Election.	
1849	Whitmore, George, Esq. 28, *Oxford-square, W.*
1862	Whitmore, William, Esq. 28, *Oxford-square, W.; and Beckenham, Kent, S.E.*
1860	Whitty, John Irwine, Esq., D.C.L., LL.D., M.A., C.E., &c. 94, *Lower Baggot-street, Dublin*; *Ricketstown-hall, Co. Carlow; and Providence-court, Queen's Co., Ireland.*
1864	Whyte, M. B., Esq. 9, *Norfolk-square, W.*
1861	1930 Wigzell, E., Esq. *Messrs. Penn & Co., Greenwich, S.E.*
1860	*Wilkinson, Major A. Eastfield, B.A., 7th Hussars. *Umbala; N.W. Provinces, India; and Army and Navy Club, S.W.*
1854	Wilkinson, Frederick E., Esq., M.D. *Sydenham, Kent, S.E.*
1839	*Wilkinson, Sir John Gardner, D.C.L., F.R.S. *Athenæum Club, S.W.*
1857	Willcock, J. W., Esq., Q.C. 6, *Stone-buildings, Lincoln's-inn, W.C.; and Rosenstead, Avenue-road, St. John's-wood, N.W.*
1857	Williams, Edwin, Esq. 137, *Fenchurch-street, E.C.*
1863	Williams, Frederick, G. A., Esq. 1, *Old-buildings, Lincoln's-inn, W.C.*
1856	Williams, Henry Jones, Esq. *Club Chambers, S.W.; and* 82, *King William-st. E.C.*
1856	Williams, Henry R., Esq. *Board of Trade, S.W.*
1858	Williams, Robert Folkestone, Esq., F.G.S. 7, *Walpole-street, S.W.*
1857	1940 Williams, Major-General Sir Wm. F., Bart., K.C.B., D.C.L., Commander-in-Chief, Canada. *Army and Navy Club, S.W.*
1830	*Willich, Charles M., Esq. 25, *Suffolk-street, Pall-mall-east, S.W.*
1859	Willoughby, Sir H. Pollard, Bart., M.P. 63A, *Brook-street, W.; Baldon-house Oxfordshire; and Berwick-lodge, Gloucestershire.*
1859	Willoughby, Henry W., Esq. 35, *Montagu-square, W.*
1861	Wilson, Captain Anthony. 55, *Moorgate-street, E.C.; and* 11, *Chepstow-villas, Bayswater, W.*
1854	*Wilson, Captain Thomas, R.N. *Edenwood, Cupar, Fife, N.B.*
1862	*Wilson, Robert Dobie, Esq. 15, *Green-street, Grosvenor-square, W.*
1860	Wilson, Thomas, Esq. 9, *Oakley-terrace, Southgate-road, N.*
1861	Windus, Commander Alfred Subb, I.N. 14, *St. James's-square, S.W.*
1862	Wing, Lieut. Arthur, R.N.
1863	1950 Wingate, Jas. F., Esq. *Club-chambers,* 15, *Regent-street, S.W.*
1862	Wingfield, Charles John, Esq. *Commissioner in Oude; and Athenæum Club, S.W.*
1861	Wingfield, the Hon. Maurice, R.N. 37, *Grosvenor-square, W.*
1864	Wodehouse, J. H., Esq. 136, *Sloane-street, Chelsea, W.*
1859	Wombwell, C. Orby, Esq.
1853	Wood, Right Hon. Sir Charles, Bart., G.C.B., M.P. 10, *Belgrave-square, S.W. and Hickleton, Yorkshire.*
1857	Woodhead, Captain H. J. Plumridge. 44, *Charing-cross, S.W.*
1863	Wood, Hy., Esq. 10, *Cleveland-square, Hyde-park, W.*
1863	Woods, Rev. Julian, E.F.G.S. *Penola, South Australia.*
1863	Woods, Samuel, Esq. *Bedford-park, Croydon.*
1864	1960 Woolcott, Geo., Esq. *Cavendish Club, W.; and* 60, *Gracechurch-street, E.C.*

f 2

Year of Election.

1862 Woolrabe, F., Esq. *Tasmania.*

1863 Worcester, J. R., Esq. *Ravensbourn-park, Lewisham, Kent, S.E.*

1863 Worms, George, Esq. 17, *Park-crescent, Portland-place, W.*

1845 Worthington, Rev. James, D.D. 27, *John-street, Bedford-row, W.C.*

1856 Worthington, J. Hall, Esq. *Alton-hill, Oxton, near Birkenhead.*

1857 Wortley, Rt. Hon. Jas. Stuart, Q.C. 29, *Berkeley-sq., W.; and Sheen, Surrey, S.W.*

1861 Wortley, the Hon. J. F. Stuart. 15, *Curzon-street, Mayfair, W.*

1863 Wright, J. A., Esq., F.R.S. 228, *Queen's-rd., N.E.; and* 29, *Gt. St. Helens, E.C.*

1863 Wright, John, Esq., C.E., F.S.A. 11, *Park-st., Westminster, S.W.; and Rochester.*

1860 1970 Wright, Rev. Henry P., Chaplain to the Forces. *New Westminster, British Columbia.*

1839 *Wyld, James, Esq., M.P. *Charing-cross, W.C.*

1863 Wylde, W. H., Esq. *Foreign Office, S.W.*

1862 Wyndham, T. Heathcote G., Esq. *Oriel-college, Oxford.*

1858 Wynne, Rt. Hon. John. *Haslewood, Sligo.*

1854 Yeats, John, Esq., LL.D. *Clayton-place, Peckham, S.E.*

1861 York, Most Rev. William Thomson, Archbishop of. *Bishopsthorpe, York.*

1859 Yorke, Lieut.-General Sir Charles, K.C.B. 19, *South-st., Grosvenor-square, W.*

1830 *Yorke, Colonel Philip J., F.R.S. 89, *Eaton-place, S.W.*

1861 Youl, James A., Esq. *Waràtah-house, Clapham-park, S.*

1857 1980 *Young, Capt. Allen. *Riversdale, Twickenham, S.W.*

1838 *Young, Charles Baring, Esq. 4, *Hyde-park-terrace, W.*

1830 *Young, George Frederick, Esq. *Limehouse, E.*

1862 Young, Sir Henry. 77, *Kensington-gardens-square, W.*

1830 *Young, James, Esq.

1858 Young, James, Esq. *Limefield, W. Calder, Midlothian.*

1857 Yule, Col. Henry, Bengal Engineers. *Messrs. Grindlay & Co.*, 55, *Parliament-street, S.W.*

1864 Zwecker, J. B., Esq. 37, *Torriano-avenue, Camden-road, N.W.*

LIST OF PUBLIC INSTITUTIONS, &c.,

TO WHICH COPIES OF THE "JOURNAL" AND "PROCEEDINGS" ARE PRESENTED

[Those marked with an asterisk * receive the Proceedings only.]

GREAT BRITAIN AND IRELAND.

Admiralty (Hydrographic Office)
Agricultural Society (Royal)
Antiquaries, Society of
Anthropological Society
Architects, Inst. of British (Royal)
Arts, Society of
Asiatic Society (Royal)
Astronomical Society (Royal)
Athenæum Club
British Museum, Library of
Cambridge University. The Library
Colonial Office
Dublin Trinity College Library
——— Geological Society (Trinity College)
Edinburgh, Royal Society of
———, The Library of Advocates
Education Department, Library of
Engineers, Institution of Civil
Ethnological Society
Foreign Office, Library of
Geological Society
Geology, Museum of Practical
Her Majesty the Queen, Library of
Horticultural Society (Royal)
Hudson Bay Company's Library
India Office, Library of the
Lancashire and Cheshire, Historic Society of
Linnean Society
Literature, Royal Society of
Liverpool Literary and Philosophical Society
*——— Mercantile Marine Association
*Manchester Chetham Library
——— Free Library
*——— Lit. and Philos. Society
Newcastle-upon-Tyne Literary and Philosophical Institution
Oxford, The Bodleian Library at
*———, Radcliffe Observatory
*Post Office Library and Literary Association
Royal Artillery Institution, Woolwich, S.E.
Royal Institution
——— Society
Statistical Society
Trade, Board of, Library of
Travellers' Club
United Service Institution (Royal)
War Depart., Topographical Depôt
Zoological Society

EUROPE.

Amsterdam	Royal Acad. of Sciences
Athens	University Library
Berlin	Academy of Sciences
—	Geographical Society
Christiania	University Library
Copenhagen	Hydrographic Office
—	Royal Society of Sciences
—	——— of Northern Antiquaries
Dijon	Académie des Sciences, Arts et belles Lettres
Darmstadt	Geographical Society
Dresden	Statistical Society
Florence	National Library of
Frankfort	Geographical Society
Geneva	Society of Nat. History
*Gotha	Perthes, M. Justus
Halle and Leipzig	German Oriental Society
Jena	University of
Paris	Société d'Ethnographie
—	——— d'Encouragement pour l'Industrie Nationale
—	——— de Géographie
Pesth	Hungarian Academy of Sciences
*Prague	Bohemian Royal Museum
Rome	Accademia dei Lincei
St. Petersburg	Imperial Academy of Sciences
—	——— Geographical Society
Leipzig	Verein von Freunder der Erdkunde zu
Lisbon	Royal Acad. of Sciences
Madrid	——— Acad. of Sciences
Milan	Lombardo-Veneto Institute of
Munich	[Militaire Bibliothèque Centrale
—	Royal Library
Naples	Ministry of the Interior
Paris	Institut Impérial
—	Académie des Sciences
—	Annales de l'Agriculture et des Régions Tropicales (Madinier, M.)
—	Bibliothèque Impériale
—	Dépôt de la Guerre
—	——— de la Marine
—	Ministère de la Marine et des Colonies *
—	Société Asiatique
Stockholm	Royal Acad. of Sciences
Strasburg	Société des Sciences Naturelles
Tübingen	University Library
Venice	Armenian Convent Library
Vienna	Imperial Academy of Sciences
—	——— Geographical Society
—	——— Geological Institute
Zürich	Society of Antiquaries
—	——— of Naturalists

ASIA.

Bombay . . . . Geographical Society
———— . . . . Asiatic Society
Calcutta . . . Asiatic Society of Bengal
———— . . . Geolog. Survey of India
*Calcutta . . . Public Library
Madras . . . . Lit. and Philosoph. Soc.
Singapore . . . Journal of Indian Archipelago

AFRICA.

Cairo . . . . . Egyptian Society
Cape Town . . The Public Library

AMERICA.

Albany . . . . New York State Library
Boston . . . . . Public Library
———— . . . . . Massachusetts State Library
———— . . . . . Society of Natural History
Brazil . . . . Historical and Geographical Institute of
Chile . . . . . University of
New Haven . . Yale College Library
*———— . . . . Silliman's Journal
New York . . Geographical and Statistical Society
Philadelphia, American Philosophical Society
————, Franklin Institute
Quebec . . . . Library of the Parliament of Canada
*Toronto . . . Department of Public Instruction for Upper Canada
————, Canadian Institute of
Washington . . Congress Library of
———— . Smithsonian Institution
———— . National Observatory
Worcester . . Antiquarian Society

AUSTRALASIA.

*Adelaide . . . . . South Australian Institute.
Melbourne . . . . . Public Library.
*———— . . . . . Mining Department.
*Victoria . . . . Royal Society.
New Zealand . . . Library of the House of Representatives.
Sydney . . . . University Library.
Tasmania . . . . . Royal Society.

NAMES OF INDIVIDUALS TO WHOM THE ROYAL PREMIUM HAS BEEN AWARDED.

1831.—Mr. Richard Lander, for the discovery of the course of the River Niger or Quorra, and its outlet in the Gulf of Benin.

1832.—Mr. John Biscoe, for the discovery of the land now named "Enderby Land" and "Graham Land," in the Antarctic Ocean.

1833.—Captain Sir John Ross, R.N., for discovery in the Arctic Regions of America.

1834.—Sir Alexander Burnes, for the navigation of the River Indus, and a journey by Balkh and Bokhara, across Central Asia.

1835.—Captain Sir George Back, R.N., for the discovery of the Great Fish River, and its navigation to the sea on the Arctic Coast of America.

1836.—Captain Robert FitzRoy, R.N., for the survey of the shores of Patagonia, Chile, and Peru, in South America.

1837.—Colonel Chesney, R.A., for the general conduct of the "Euphrates Expedition" in 1835-6, and for accessions to the geography of Syria, Mesopotamia, and the Delta of Susiana.

1838.—Mr. Thomas Simpson—Founder's Medal—for the discovery and tracing, in 1837 and 1838, of about 300 miles of the Arctic shores of America.

1838.—Dr. Edward Rüppell—Patron's Medal—for his travels and researches in Nubia, Kordofán, Arabia, and Abyssinia.

1839.—Col. H. C. Rawlinson, e.i.c.—Founder's Medal—for his travels and researches in Susiana and Persian Kurdistán, and for the light thrown by him on the comparative geography of Western Asia.

——— Sir R. H. Schomburgk—Patron's Medal—for his travels and researches during the years 1835-9 in the colony of British Guayana, and in the adjacent parts of South America.

1840.—Lieut. Raper, r.n.—Founder's Medal—for the publication of his work on 'Navigation and Nautical Astronomy.'

——— Lieut. John Wood, i.n.—Patron's Medal—for his survey of the Indus, and re-discovery of the source of the River Oxus.

1841.—Captain Sir James Clark Ross, r.n.—Founder's Medal—for his discoveries in the Antarctic Ocean.

——— Rev. Dr. E. Robinson, of New York—Patron's Medal—for his work entitled 'Biblical Researches in Palestine.'

1842.—Mr. Edward John Eyre—Founder's Medal—for his explorations in Australia.

——— Lieut. J. F. A. Symonds, r.e.—Patron's Medal—for his survey in Palestine, and levels across the country to the Dead Sea.

1843.—Mr. W. J. Hamilton—Founder's Medal—for his researches in Asia Minor.

——— Prof. Adolph Erman—Patron's Medal—for his extensive geographical labours.

1844.—Dr. Beke—Founder's Medal—for his extensive explorations in Abyssinia.

——— M. Charles Ritter—Patron's Medal—for his important geographical works.

1845.—Count P. E. de Strzelecki—Founder's Medal—for his explorations and discoveries in the South-Eastern portion of Australia, and in Van Diemen's Land.

——— Professor A. Th. Middendorff—Patron's Medal—for his extensive explorations and discoveries in Northern and Eastern Siberia.

1846.—Captain Charles Sturt—Founder's Medal—for his various and extensive explorations in Australia.

——— Dr. Ludwig Leichhardt—Patron's Medal—for a journey performed from Moreton Bay to Port Essington.

1847.—Sir James Brooke, Rajah of Saráwak and Governor of Labuan—Founder's Medal—for his expedition to Borneo.

——— Captain Charles Wilkes, u.s.n.—Patron's Medal—for his Voyage of Discovery in the S. Hemisphere and in the Antarctic Regions, in the years 1838-42.

1848.—Austen H. Layard, Esq., d.c.l., m.p.—Founder's Medal—for his contributions to Asiatic geography, researches in Mesopotamia, and discoveries of the remains of Nineveh.

——— Baron Ch. Hügel—Patron's Medal—for his explorations of Cashmere and surrounding countries, communicated in his work entitled 'Kashmir und das Reich der Siek.'

1849.—Col. John Ch. Frémont—Patron's Medal—for his successful explorations of the Rocky Mountains and California; and for his numerous Discoveries and Astronomical Observations.

1849.—The Rev. DAVID LIVINGSTONE, of Kolobeng—a Chronometer Watch —for his successful explorations of South Africa.

1850.—Dr. GEORGE WALLIN, of Finland—25 Guineas—for his Travels in Arabia.

1850.—Mr. THOMAS BRUNNER—25 Guineas—for his Explorations in the Middle Island of New Zealand.

1851.—Dr. JOHN RAE—Founder's Medal—for his Survey of Boothia and of the Coasts of Wollaston and Victoria Lands.

——— Captain HENRY STRACHEY—Patron's Medal—for his Surveys in Western Tibet.

1852.—Mr. FRANCIS GALTON—Founder's Medal—for his Explorations in Southern Africa.

——— Commander E. A. INGLEFIELD, R.N.—Patron's Medal—for his Survey of the Coasts of Baffin Bay, Smith and Lancaster Sounds.

1853.—Rear-Admiral WILLIAM HENRY SMYTH—Founder's Medal—for his valuable Surveys in the Mediterranean.

——— Captain ROBERT J. M. M'CLURE, R.N.—Patron's Medal—for his discovery of the North-West Passage.

1854.—The Rev. DAVID LIVINGSTONE, M.D., etc.—Patron's Medal—for his Scientific Explorations in Central Africa.

——— Mr. CHARLES J. ANDERSSON—a Set of Surveying Instruments—for his Travels in South-Western Africa.

1855.—ELISHA KENT KANE, M.D.—Founder's Medal—for his discoveries in the Polar Regions.

——— HEINRICH BARTH, Phil. Dr.—Patron's Medal—for his Explorations in Central Africa.

——— Corporal J. F. CHURCH, of the Royal Engineers—a Watch and Chain —for his scientific observations while attached to the Mission in Central Africa.

1856.—Mr. AUGUSTUS C. GREGORY—Founder's Medal—for his Explorations in Western and Northern Australia.

——— Lieut.-Col. ANDREW SCOTT WAUGH, Bengal Engineers—Patron's Medal—for the Great Trigonometrical Survey of India.

1857.—Captain RICHARD COLLINSON, R.N.—Founder's Medal—for his Discoveries in the Arctic Regions.

——— Prof. ALEX. DALLAS BACHE, Superintendent U. S. Coast Survey—Patron's Medal—for his extensive Surveys of America.

1858.—Captain RICHARD F. BURTON—Founder's Medal—for his Explorations in Eastern Central Africa.

——— Captain JOHN PALLISER—Patron's Medal—for his Explorations in British North America and the Rocky Mountains.

——— Mr. JOHN MACDOUALL STUART—a Gold Watch—for his Discoveries in South and Central Australia.

1859.—Lady FRANKLIN—Founder's Medal—in commemoration of the discoveries of Sir J. Franklin.

——— Captain Sir F. LEOPOLD MCCLINTOCK, R.N.—Patron's Medal—for his Discoveries in the Arctic Regions.

1860.—Captain JOHN HANNING SPEKE—Founder's Medal—for the Discovery of the Great Lake Victoria Nyanza, Eastern Africa, &c.

——— Mr. JOHN MACDOUALL STUART—Patron's Medal—for his Explorations in the Interior of Australia.

1861.—Mr. Robert O'Hara Burke—Founder's Medal—for his Explorations in Australia.

——— Captain Thomas Blakiston—Patron's Medal—for his Survey of the River Yang-tsze-kiang.

——— Mr. John King—a Gold Watch—for his meritorious conduct while attached to the Expedition under Mr. R. O'Hara Burke.

1862.—Mr. Frank T. Gregory—Founder's Medal—for his Explorations in Western Australia.

——— Mr. John Arrowsmith—Patron's Medal—for the very important services he has rendered to Geographical Science.

——— Mr. William Landsborough—a Gold Watch—for successful Explorations in Australia.

——— Mr. John M'Kinlay—a Gold Watch—for successful Explorations in Australia.

——— Mr. Frederick Walker—a Gold Watch—for successful Explorations in Australia.

1863.—Captain J. A. Grant—Patron's Medal—for his Journey from Zanzibar across Eastern Equatorial Africa to Egypt, in company with Captain Speke.

——— Baron C. von der Decken—Founder's Medal—for his two Geographical Surveys of the lofty Mountains of Kilima-njaro.

——— Rev. W. Gifford Palgrave—the sum of 25 Guineas—for the purchase of a Chronometer or other Testimonial, for his adventurous Journey in and across Arabia.

ACCESSIONS TO THE LIBRARY AND MAP-ROOM,

FROM 1ST SEPTEMBER, 1863, TO 1ST JUNE, 1864.

[*When* LONDON *is the place of publication, the word* LONDON *is omitted.*]

LIBRARY.

EUROPE.

Titles of Books. — *Donors.*

GERMANY—

DEITZ, R.—Die Gewerbe im Grossherzogthum Baden. 8vo. Karlsruhe 1863. — The AUTHOR.

PAGET, J.—Hungary and Transylvania, with remarks on their condition, Social, Political, and Economical. 2 vols. Plates. 8vo. 1855. — PURCHASED.

IONIAN ISLANDS—

DAVY, J.—Notes and Observations on the Ionian Islands and Malta. 2 vols. 8vo. 1842. — PURCHASED.

PORTUGAL—

PORTUGALIÆ Monumenta Historica a Sæculo Octavo post Christum usque ad Quintumdecimum. Jussu Academiæ Scientiarum Olisiponensis edita. Leges et Consuetudines, Vol. I. No. 3. Scriptores, Vol. I. No. 3. Fol. Lisbon, 1863. — ROYAL ACADEMY, LISBON.

RUSSIA—

BILLINGS, J.—An Account of a Geographical and Astronomical Expedition to the Northern parts of Russia in 1785 to 1794. By Martin Sauer. 4to. 1802. — PURCHASED.

SEYMOUR, H. D.—Russia on the Black Sea and Sea of Azof. Map. 8vo. 1855. — PURCHASED.

SCANDINAVIA—

Iceland.

LYMINGTON, A. J.—Pen and Pencil Sketches of Faröe and Iceland. 8vo. 1862. — PURCHASED.

TEMPLAR, A.—Six Weeks in Iceland. 8vo. 1862. — H. J. C. BEAVAN, Esq.

BARING-GOULD, S.—Iceland; its Scenes and Sagas. With Map. 8vo. 1863. — H. GREENFIELD, Esq.

Sweden.

Sylvanus; Rambles in Sweden and Gottland. 8vo. 1847. — PURCHASED.

SWITZERLAND—

Expeditions on the Glaciers, including an ascent of Mont Blanc, Monte Rosa, Col du Géant, and Mont Buet. By a Private of the 38th Artists, and Member of the Alpine Club. 8vo. 1864. — The AUTHOR.

ASIA.

Titles of Books. *Donors.*

BADGER, G. P.—The Nestorians and their Rituals, with the narrative of a Mission to Mesopotamia. 2 vols. Plates. 8vo. 1852. PURCHASED.

BARKER, W. B.—Lares and Penates. Edited by W. F. Ainsworth. 8vo. 1853. PURCHASED.

BENJAMIN, J. J.—Eight Years in Asia and Africa, from 1846 to 1855. 8vo. Hanover, 1863. DR. B. SEEMANN.

CALVERT, F.—Contributions to the Ancient Geography of the Troad. 8vo. 1861. The AUTHOR.

D'AUTEROCHE, C.—A Journey into Siberia in 1761. 4to. 1770. PURCHASED.

DOBELL, P.—Travels in Kamtchatka and Siberia, with a Narrative of a Residence in China. 2 vols. 8vo. 1830. PURCHASED.

ELLIOT, R.—Views in the East, comprising India, Canton, and the Red Sea. Plates. Vols. I. and II. Royal 8vo. 1833. PURCHASED.

HEKEKYAN BEY.—Treatise on the Chronology of Siriadic Monuments. 8vo. 1863. The AUTHOR.

JORDANUS, FRIAR.—The Wonders of the East; translated from the Latin, by Col. H. Yule, Hakluyt Society. 8vo. 1863. The SOCIETY.

RENAUD, M.—Rélations Politiques et Commerciales de l'Empire Romain avec l'Asie Orientale. Avec quatre Cartes. 8vo. Paris, 1863. The AUTHOR.

SANGUINETTI, B. R.—Voyages D'Ibn Batutah texte Arabe, accompagné d'une traduction. 8vo. Paris, 1859. PURCHASED.

WOODCOCK, W. J.—Scripture Lands; being a Visit to the Scenes of the Bible. 8vo. 1849. PURCHASED.

INDIA—

CRAWFURD, J.—A Descriptive Dictionary of the Indian and adjacent Countries. 8vo. 1856. PURCHASED.

DUBOIS, J. A.—Description of the Character, Manners, and Customs of the People of India. Translated from the French manuscript. 4to. 1817. PURCHASED.

An Historical Relation of the Origin, Progress, and Final Dissolution of the Government of Rohilla Afghans. 8vo. 1787. PURCHASED.

SCHLAGINTWEIT, EMIL.—Buddhism in Thibet. 8vo.; and Atlas, Fol. 2 vols. Leipzig, 1863. The AUTHOR.

A Sketch of Assam, with some account of the Hill Tribes. By an Officer in the H.E.I. Company. 8vo. 1847. PURCHASED.

SLEEMAN, W. H.—Rambles and Recollections of an Indian Official. 2 vols. 8vo. 1844. PURCHASED.

SPIER, MRS.—Life in Ancient India. 8vo. 1856. PURCHASED.

JAPAN—

MALTE-BRUN, V. A.—Le Japon; Histoire et Déscription, Mœurs, Coutumes, et Religion. 2 vols. 12mo. Paris, 1864. The AUTHOR.

PERSIA—

BRIGGS, H. G.—A Sketch of the Parsis, or Modern Zerdusthians. 8vo. Edinburgh, 1852.

FERRIER, J. P.—Caravan Journeys and Wanderings in Persia, Afghanistan, Turkistan, and Beloochistan, with notices of the Countries lying between Russia and India. 8vo. 1857. PURCHASED.

Titles of Books. *Donors.*

ASIATIC ARCHIPELAGO—

MONEY, J. W. B.—Java; or How to Manage a Colony. 2 vols. 8vo. 1861. PURCHASED.

NEWBOLD, T. J.—A Political and Statistical Account of the British Settlements in the Straits of Malacca. 2 vols. 8vo. 1839. PURCHASED.

CHINA—

SWINHOE, ROBERT.—Notes on the Island of Formosa, 8vo. 1863. The AUTHOR.

AFRICA.

BEKE, C. T.—Lecture on the Sources of the Nile, and on the means requisite for their final determination. 8vo. 1864. The AUTHOR.

BUNBURY, J. F.—Journal of a Residence at the Cape of Good Hope. 8vo. 1848. PURCHASED.

BURET, E.—Question d'Afrique; de la double conquête de l'Algérie par la Guerre et la Colonisation. 8vo. Paris, 1842. PURCHASED.

BURTON, R. F.—Abeokuta and the Cameroon Mountains. 2 vols. 8vo. 1863. The AUTHOR.

CAMPBELL, T.—Letters from the South, written during a Journey to Algiers. 8vo. Philadelphia, 1836. PURCHASED.

FORBES, Lieut.—Six Months' Service in the African Blockade. 8vo. 1849. PURCHASED.

HAMILTON, J.—Wanderings in North Africa. 8vo. 1856. PURCHASED.

Mission Ghadames. Rapports Officiels et Documents à l'Appui. 8vo. Alger, 1863. M. M. GRAD.

SPEKE, J. H.—Journal of the Discovery of the Source of the Nile. 8vo. 1863. The AUTHOR.

Wanderings in West Africa, by a F.R.G.S. 2 vols. 8vo. 1863. Mrs. BURTON.

A short Relation of the River Nile; of its Source, Currents, &c. By an Eye Witness. 12mo. 1673. PURCHASED.

AMERICA.

COCHRANE, C. S.—Journal of a Residence and Travels in Columbia during 1823-24. 2 vols. 8vo. 1825. PURCHASED.

DE ROOS, F. F.—Personal Narrative of Travels in the U.S. of Canada in 1826. 8vo. 1827. PURCHASED.

GOODSIR, R. A.—An Arctic Voyage to Baffin's Bay and Lancaster Sound, in search of Friends, with Sir John Franklin. 8vo. 1850. PURCHASED.

HIND, H. Y.—Explorations in the Interior of the Labrador Peninsula. 2 vols 8vo. 1863. The AUTHOR.

MACDONALD, D. G. F.—British Columbia and Vancouver's Island. Map. 8vo. 1862. PURCHASED.

MARCY, R. B.—Handbook for Prairie Traveller. 8vo. New York, 1859. PURCHASED.

Message of the President of the United States to the two Houses of Congress at the commencement of the third Session of the thirty-seventh Congress. 2 vols. 8vo. Washington, 1862. J. E. WORCESTER, Esq.

MOLLIEN, G.—Travels in the Republic of Columbia in 1822-23. Translated from the French. 8vo. 1824. PURCHASED.

Titles of Books. *Donors.*

The Journals, detailed Reports and Observations, relative to the Exploration, by Capt. Palliser, of that portion of British North America which lies between the British Boundary Line, the height of Land or Watershed of the Northern Ocean, &c., during 1857, 58, 59, and 60. (Parliamentary Reports.) Fol. 1863. W. Spottiswoode, Esq.

Phipps, C. J.—A Voyage towards the North Pole in 1773. 4to. 1774. Purchased.

Thoreau, H. D.—A Week on the Concord and Merrimac Rivers. 8vo. Boston, 1849. Purchased.

Warden, B. B.—A Chorographical and Statistical Description of the District of Columbia. 8vo. Paris, 1816. Purchased

South America—

Azara, F. de.—Apuntamientos para la Historia Natural de los Quadrúpedos del Paraguay, y Rio de la Plata. 8vo. Madrid, 1802. Purchased.

Bancroft, E.—An Essay on the Natural History of Guiana. 8vo. 1769. Purchased.

Bates, H. W.—Naturalist on the River Amazons. 2 vols. 8vo. 1863. Purchased.

Bonelli, H. de.—Travels in Bolivia. 8vo. 1854. Purchased.

Bonnycastle, R. H.—Spanish America, or a Descriptive, Historical, and Geographical Account of the Dominions of Spain in the Western Hemisphere, Continental and Insular. 8vo. 1818. Purchased.

Brackinbridge, H. M.—Voyage to South America. 2 vols. 8vo. 1820. Purchased.

Castlenau, F. de.—Expédition dans les Parties Centrales de l'Amérique du Sud, de Rio de Janeiro à Lima, et de Lima au Para. 6 vols., and Plates of Views, Natural History, Geology, and Maps. 7 vols. 4to., and 2 vols. folio. 15 vols. Paris, 1850-57. C. R. Markham, Esq.

Cox, G. E.—Viage en las Rejiones Septentrionales de la Patagonia, 1862-63. Map. 8vo. Santiago, 1863. The Author.

Davie, J. C.—Letters from Paraguay. 8vo. 1805. Purchased.

Ewbank, Thos.—Life in Brazil. 8vo. 1856. Purchased.

Gama, Vasco da.—Roteiro da Viagem de Vasco da Gama em 1497, correcta e augmentada por A. Herculano e O. Barão do Castello de Paiva. 8vo. Lisboa, 1861. The Editors.

Gratt, M. du.—La République du Paraguay. 8vo. 1862. Purchased.

Hinchcliff, S. W.—South American Sketches. 8vo. 1863. The Author.

Hippisley, G.—Narrative of an Expedition to the Rivers Orinoco and Apuré, in 1817. 8vo. 1819. Purchased.

Juan, Don George, and Don Ant. de Ulloa.—Voyage to South America; translated by J. Adams. 8vo. 1806. Purchased.

Koster, H.—Travels in Brazil. 2 vols. 8vo. 1817.

Lloyd, S. H.—Sketches of Bermuda. Map. 8vo. 1835. Purchased.

Mawe, J. Travels in the Interior of Brazil. 4to. 1812. Purchased.

Robinson, J. H.—Journal of an Expedition 1400 Miles up the Orinoco, and 300 up the Aranca. 8vo. 1822. Purchased.

Skinner, J.—The present State of Peru. 4to. 1805. Purchased.

Smith, A.—Peru as it is; a Residence in Lima, &c. 2 vols. in one. 8vo. 1839. Purchased.

Titles of Books. *Donors.*

SMITHERS, J.—Missions in South America. 8vo. 1854. PURCHASED.

STEVENSON, W. B.—A Historical descriptive Narrative of Twenty Years' Residence in South America. 3 vols. 8vo. 1825. PURCHASED.

Three Years in the Pacific; containing Notices of Brazil, Chile, Bolivia, Peru, &c., in 1831-32-33-34. By an Officer in the U.S. Navy. 2 vols. 8vo. 1835. PURCHASED.

VERTEUIL, L. A. A. DE.—Trinidad; its Geography, Natural Resources, Administrations, &c. &c. 8vo. 1858. PURCHASED.

WILCOCKS, S. H.—History of the Vice-Royalty of Buenos Ayres. 8vo. 1807. PURCHASED.

AUSTRALIA.

DUTTON, F.—South Australia and its Mines; with an Historical Sketch of the Colony to the period of Captain Grey's departure. 8vo. 1846. PURCHASED.

HOOD, T. H.—Notes of a Cruise in the Western Pacific in H.M.S. *Fawn* in 1862. 8vo. Edinburgh, 1863. The AUTHOR.

JUKES, J. B.—Narrative of the Surveying Voyage of H.M.S. *Fly* in Torres Straits, &c., during 1842-46. 2 Vols. 8vo. 1847. PURCHASED.

SHILLIBEER, J.—Narrative of the *Briton's* Voyage to Pitcairn's Island. 8vo. 1818. PURCHASED.

ASTRONOMY AND NAVIGATION.

Annales Hydrographiques. 1862 to date. Paris. DÉPÔT GÉNÉRAL DE LA MARINE.

Astronomical and Meteorological Observations made at the Radcliffe Observatory. Vol. 21. 8vo. Oxford, 1864. THE RADCLIFFE TRUSTEES.

BLARAMBERG, LIEUT.-GEN.—Catalogue of Trigonometrical and Astronomical Positions determined in the Russian Empire and along its Frontiers up to 1860. 4to. St. Petersburg, 1863. THE RUSSIAN TOPOGRAPHICAL SOCIETY.

FINDLAY, A. G.—South Pacific Directory. 8vo. 1863. The AUTHOR.

KERHALLET, CHAS. P. DE.—Manuel de la Navigation dans la Mer des Antilles, et dans le Golfe du Mexique. Seconde Partie. 8vo. Paris, 1863. DÉPÔT GÉNÉRAL DE LA MARINE.

MAYO, J. J.—Mercantile Navy List and Annual Appendage to the Commercial Code of Signals of all Nations. 8vo. 1864. E. H. COLEMAN, Esq.

Nautical Almanac, with Supplement for the year 1867. 8vo. 1863. COMMISSIONERS OF THE ADMIRALTY.

MISCELLANEOUS.

Annual Statement of the Trade and Navigation of the United Kingdom with Foreign Countries and British Possessions in 1862. 4to. 1863. W. SPOTTISWOODE, Esq.

BALFOUR, E.—The Timber Trees, Timber, and Fancy Woods. Second Edition. 8vo. Madras, 1862. The AUTHOR.

DICK, A. H.—Compendium of Mathematical Geography. 12mo. 1863. The AUTHOR.

Ensaios sobre a Statistica das Possessoes Portuguezas no Ultramar. Livro 1, 2, 3, 4 & 5. 8vo. Lisboa, 1844-62. DON JOSÉ DA SILVA MENDES SAAL.

Titles of Books. *Donors.*

ESENGERY AUTAL.—Budupesti Szembi, Szerkeszti és Kiadja. 12 to 60, Füzet incl. in 12 Nos. 8vo. Pest, 1861-63.
HUNGARIAN ACAD. SCIENCES.

FOX, C. R.—Engravings of unpublished or rare Greek coins with descriptions. Part I., Europe; Part II., Asia and Africa. 4to. 1862.
The AUTHOR.

Geologische Specialkarte des Grossherzogthums Hessen; Herausgegeben vom Mittelrheinischen geologischen Verein; Section Erbach, der karte Grossh. Hess. 8vo. Darmstadt, 1863. The INSTITUTE.

Globus illustrirte. Zeitschrift fur Länder- und Volker-kunde Chronick der Reisen und Geographische Zeitung. 4to. Wien, 1864.
The PUBLISHERS.

IPOLYI, ARNOLD.—Közepkori Szobrászat Magyarorszagon Eladata. 10 Kötet. 4to. Pest, 1863. HUNGARIAN ACAD. SCIENCES.

JANIS, E.—Mimi Transilvaniae Erdély Ermei, Képatlaszezal. 4to. Pest, 1862. HUNGARIAN ACAD. SCIENCES.

JOHNSON, A. K.—Index Geographicus; being a list alphabetically arranged of the principal places on the Globe, &c. Royal 8vo. 1864.
The AUTHOR.

Kepatlasz az archáelogiai Kizlemenzek. 2 Kötetchez. Fol. Pest. 1861.
HUNGARIAN ACAD. SCIENCES.

LYELL, SIR CHAS.—Principles of Geology. 8vo. 1853. PURCHASED.

MACKAY, A.—Elements of Modern Geography for the use of the Junior Classes. 12mo. Edinburgh, 1864. The AUTHOR.

MCHENRY.—The Cotton Trade, its bearing upon the prosperity of Great Britain and Commerce of the American Republics. 8vo. 1863.
The AUTHOR.

MALTE-BRUN, N.—Rapport fait le 18e Dec. 1863, à la Second Assemblée Générale Annuelle de la Société de Géographie sur ses travaux, et sur les progrès des Sciences Géographiques pendant l'Année 1863. 8vo. Paris, 1863. The AUTHOR.

MARSDEN, W.—The Travels of Marco Poli, translated from the Italian, with Notes and Map. 4to. 1818. PURCHASED.

MARTIUS, C. P. VON.—Glossaria Linguarum Brasiliensium. Glossarios de Diversas Lingoas e Dialectos, que Fallao os Indios no Imperio do Brazil. 8vo. Erlangen, 1863. The AUTHOR.

MILNER, THOS.—Gallery of Geography. Parts 1-9. Royal 8vo. 1863-64.
The AUTHOR.

PERRY, A.—Bibliographie Seismique. 8vo. Dijon. The AUTHOR.

SLOAN, SIR H.—A Voyage to the Islands of Madeira, Barbadoes, Nieves, St. Christopher's and Jamaica. 2 Vols. Folio. 1725. PURCHASED.

SOARES, J. P. C.—Quadros Navaes, ou Collecção dos Folhetins Maritimos de patriota seguidos de uma Epopeia Naval Portugueza. 3 Vols. 8vo. Lisboa, 1861-63. DON JOSÉ DA SILVA MENDES SAAL.

SPARKS, J.—Memoirs of the Life and Travels of John Ledyard, from his Journals and Correspondence. 8vo. 1828. PURCHASED.

WOLFF, J.—Travels and Adventures. 2 Vols. 8vo. 1860. PURCHASED.

PERIODICALS.

Titles of Books.	*Donors.*
American Journal. Nos. 107, 108. 8vo. New Haven, 1863.	The Editors
Artizan, The. To date.	The Proprietors.
Athenæum, The. To date.	The Proprietors.
Bibliothèque Universelle, La. To date.	The Proprietors.
Bookseller, The. To date.	The Proprietors.
Church Missionary Intelligencer. To date. 8vo. 1863.	Church Missionary Society.
Edinburgh Review, The. To date.	By Purchase.
Intellectual Observer, The. To date.	The Proprietors.
Mercantile Marine Magazine. To date.	The Editor.
Mittheilungen. No. 10. 4to. Gotha, 1863.	M. Justus Perthes.
Publisher's Circular, The. To date.	The Proprietors.
Quarterly Review, The. To date.	J. Murray, Esq.
Wesleyan Missionary Notices. To date. 8vo. 1863.	Wesleyan Missionary Society.

TRANSACTIONS OF SOCIETIES.

EUROPE.

Titles of Books.	*Donors.*
Anthropological Review. To date. 8vo. 1863.	The Anthropological Society.
Architects, Royal Institute of British. To date. 4to. 1863.	The Institute.
Assurance Magazine. To date. 8vo. 1864.	The Institute of Actuaries.
Horological Journal. To date. 8vo. 1863.	The Horological Institute.
Horticultural Society, Proceedings of the Royal. No. 8. 8vo. 1863.	The Society.
Geological Journal, The Quarterly. No. 76. 8vo 1863.	The Geological Society.
Proceedings of the Royal Institution. No. 38. 8vo. 1863.	The Institution.
Royal Society, Proceedings of the. No. 57 and No. 58. 8vo. 1863.	The Society.
Royal United Service Institution, Journal of the. No. 27. 8vo. 1863.	The Institution.
Statistical Society, Journal of the. Vol. XXVI., Part 4; with Index, Vols. XVI. to XXV. 8vo. 1863.	The Society.
Society of Edinburgh, Proceedings of the Royal. No. 59. 8vo. 1863.	The Society.
Royal Irish Academy, Transactions of the. Vol. XXIV., Part 1. Antiquities. Vol. XXIV., Part 1, &c. 4to. Dublin, 1864. Proceedings, Vol. VIII., Parts 1, 2, 3, 4, 5, and 6. 8vo. Dublin, 1863.	The Academy.
Comptes Rendu hebdomadaires des Séances de l'Academie des Sciences. Nos. 1 to 22 (wanting No. 14). 4to. Paris, 1863.	The Academy.
Géographie de Paris, Bulletin de la Société de. To date. 8vo. 1868.	The Society.

Titles of Books. *Donors.*

Mémoires de la Société des Sciences Naturelles de Strasbourg. To date. 4to. Paris and Strasbourg, 1862. The Society.

Abhandlungen der Königl. Schwedischer Akad. der Wissenschaften. Vols. 16, 18, 19, 21-28. 8vo. Hamb. mit Leipzig, 1757-68. S. M. Drach, Esq.

Notizblatt des Vereins für Erdkunde. 3tte Folgo 2te Heft. Nr. 13-24. 8vo. Darmstadt, 1863. The Institute.

Sitzungsbericht der Kaiserlichen Akademie der Wissenschaften. Vols. XLVI. and XLVII. 8vo. Wien, 1863. The Academy.

.... Königl. bayerische Akademie der Wissenschaften zu München. To date. 8vo. München, 1863. The Academy.

Zeitschrift der Deutschen Morgenländischen Gesellschaft. To date. 8vo. Leipzig, 1863. The Society.

Zeitschrift für Allgemeine Erdkunde. To date. 8vo. Berlin, 1863. Dr. Neumann.

Atti del reale Instituto Lombardo di Scienze, Lettere ed Arti. To date. Fol. Milano, 1863. The Institute.

Memorie del reale Instituto Lombardo di Scienze, Lettere ed Arti. To date. Fol. Milano, 1863. The Institute.

Boletim e Annaes de Conselho Ultramarino. Nos. 104, 105. 4to. Lisbon, 1863. Academy of Sciences.

Corpo diplomatico Portugez contendo os actos e Relações Politicas e Diplomaticas de Portugal. Desde o Seculo 16; por Luiz. A. R. da Silva. Vol. 1. 4to. Lisboa, 1862. Royal Acad. Lisbon.

Historia e Memorias da Academia Real das Sciencias de Lisboa, Classe de Sciencias, Moraes, Politicas et Bellas-Lettras. Nova Serie. Tome 2. Parte 2. 4to. Lisboa, 1864. Royal Acad. Lisbon.

Lendas da India por Gaspar Correa; publicadas de ordem da classe de Sciencias, Moraes, Politicas, e Bellas Lettras da Academia Real das Sciencias de Lisboa. Vol. 3. 4to. Lisboa, 1862-63. Royal Acad. Lisbon.

Archaelogiai köszlemények. Kötet 2 and 3. 8vo. 1861. Hungarian Acad. Sciences.

Kazai és Külföldi Iskolázás az árpád-Korszak, alatt, irta vass Jozseff. 8vo. Peste, 1862. Hungarian Acad. Sciences.

Magyar Akademiai Ertesiti. A Philosphiai Törvény-Es Tortenettudomanye osztalyok Kozlönye, Második Kötet, Harmadik Kötet, &c. 8vo. Peste, 1863. Hungarian Acad. Sciences.

A. Magyar Birodalour, Termeszeti-Viszonyainak Leirása. 1 Kötet, 1, 2 and 3 Füzet. 8vo. Peste, 1863. Hungarian Acad. Sciences.

Magyar Történelmi Tár, kiadga a Magyar Sud Akademia, 9, 10, 11 and 12. 8vo. Peste, 1861-3. Hungarian Acad. Sciences.

Monumenta Hungariæ Historica. Magyar Történsluei Ernlekek, &c. 8vo. Peste, 1863. Hungarian Acad. Sciences.

Statistikai Közleinények, Negyedik Kötet, 1 and 2 Füzet. Harmadik, Kötet. 1 Füzet. Harmadik. Kötet 2 Füzet. Masodik Kötet. 2 Füzet. 8vo. Peste, 1862-63. Hungarian Acad. Sciences

Török Magyar-kori Történeliernlékek·kiadja a Magyar Tudomanyos Akademia, Tortenelmi Bizottmanya Elsö Ostztály Okmanytar, 1 and 2. 8vo. Peste, 1863. Hungarian Acad. Sciences.

Bulletin de l'Academie Impériale des Sciences de St. Petersbourg. To date. 4to. St. Petersbourg, 1862. The Society.

Titles of Books. — *Donors.*

Compte-rendu de la Société Impérial Géographique de Russie pour l'an 1862. 8vo. St. Petersbourg, 1863. — The SOCIETY.

ASIA.

Transactions of the Bombay Geographical Society. Vol. 16. 8vo. Bombay, 1863. — The SOCIETY.

AMERICA.

Canadian Institute. The Canadian Journal, No. 47. 8vo. Toronto, 1863. — The CANADIAN INSTITUTE.

Montreal. The Canadian Naturalist and Geologist, with the Proceedings of the Society of Natural History. Nos. 4, 5. 8vo. Montreal, 1863. — The SOCIETY.

Geographical and Statistical Society of New York, Proceedings of the American. No. 4. 8vo. New York, 1862-3. — The SOCIETY.

Franklin Institute, Journal of the. To date. 8vo. Philadelphia, 1863. — The INSTITUTE.

Boletin de la Sociedad Mexicana, de Geografia y Estadistica. To date. 4to. Mexico, 1863. — The SOCIETY.

MAPS, CHARTS, &c.

GENERAL ATLASES.

Maps, Charts, &c. — *Donors.*

The "Imperial Library Atlas" in complete form. By Geo. Philips and Sons. 1864. — The AUTHORS.

.... Part 18, containing the Consulting Index. By Geo. Philips and Son. 1864. — The AUTHORS.

Middle-Class Atlas of General Geography, in a series of 29 Maps. By W. M'Leod, F.R.G.S. — EDWARD WELLER, Esq.

Minor Atlas, containing 62 Maps. By Hermann Moll. 1736. — S. M. DRACH, Esq.

Atlas zur Industrie- und Handels-geographie.
Karte No. 9. Preussen, Deutschland, &c. Scale, 1 : 1,000,000.
.... 10. Oesterreich. Scale, 1 : 3,800,000.
.... 11. Frankreich und die Schweiz. Scale, 1 : 3,900,000. By Dr. V. F. Klun and Dr. H. Lange. Leipzig, 1864. With description. — The AUTHORS.

Atlas, part of. On 25 sheets: shewing the principal fortified towns in Europe about the year 1565. — PURCHASED.

THE WORLD.

Eastern and Western Hemispheres, outline Maps. School series. 12 copies. Radius 6 inches. — The SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE.

World. Mercator's Projection. 8 sheets. Printed in colours. By H. Berghaus and F. v. Stülpnagel. Gotha, 1863. Scale, 1 inch = 6½ degrees (equat.). — PURCHASED.

EUROPE.

Maps, Charts, &c. *Donors.*

DENMARK—

Topographisk Kaart over Kongeriget Danmark med Hertugdömmet Slesvig Udarbejdet og udgivet af Generalstaben, On 81 sheets. Scale 1:80,000, or 1 inch = 1·26 miles. The following sheets supplied, viz. Index sheet with Title, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16, 17, 20, and 21.

Generalstabens Topographiske Kaart over Denmark. 1862.

Kaart sand Störrelse over Slesvigs Fastland og als. Efter Krigsministerens Befaling recognosceret i Aarene 1851 til 1854. A Map of Slesvig, on 6 sheets, complete. Scale 1:120,000, or 1 inch = 1·9 mile.
The DANISH GOVERNMENT.

Holstein und Lauenberg. 8 Blatter, nebst Titel und Erklarungen. Kopenhagen im Generalstabe, 1861. Complete on 8 sheets. Scale 1:120,000, or 1 inch = 1·9 mile.

Kjøbenhavns Omegn. I. VI. Blade. Maalt 1852, rettet til 1855. Complete on 6 sheets. Scale 1:20,000, or 1 mile = 3·168 inches.

Geological Maps.

En part af Arnborg og Brande sogne, Hammerum og Nörvaag Herreder. Ringkjøbing og Vejle Amter Generalstaben, 1847. Scale 1:20,000, or 1 mile = 3·168 inches.

Skarild Sogn. Hammerum Herred Ringkjøbing Amt Generalstaben, 1847. On 2 sheets. Scale 1:20,000, or 1 mile = 3·168 inches.

Felding Sogn. Hammerum Herred. Rinkjøbing Amt Generalstaben, 1847. Scale 1:20,000, or 1 mile = 3·168 inches.

Nörre Vium Sogn. Bølling Herred. Ringkjøbing Amt Generalstaben, 1847. Scale 1:20,000, or 1 mile = 3·168 inches.

Assing Sogn. Hammerum Herred. Ringkjøbing Amt Generalstaben, 1847. Scale 1:20,000, or 1 mile = 3·168 inches.

Borris Sogn. Bølling Herred. Ringkjøbing Amt Genneralstaben, 1847. Scale 1:20,000, or 1 mile = 3·168 inches. On 2 sheets.

Hoven Sogns. Norland. Norre Hered. Ringkjøbing Amt Generalstaben, 1848. Scale 1:20,000, or 1 mile = 3·168 inches.

En part af Sönder omme Sogn Norvang Herred, Vejle Amt Generalstaben, 1848. Scale 1:20,000, or 1 mile = 3·168 inches.

Koldings Omegn; til Hjarup Sogn og den Slesvigske Groendse, &c., Generalstaben, 1851. Scale 1:40,000, or 1 mile = 1·534 inches.

Höje Moen (Magleby og Borre Sogne) Generalstaben, 1854. Scale 1:20,000, or 1 mile = 3·168 inches. 2 sheets.

Generalkaart over Sönderjydland, Hertugdömmet Slesvig og dele af ribe Amt. Scale 1:240,000, or 1 inch = 3·8 miles. Generalstaben, 1860.
The DANISH GOVERNMENT.

Kort over Als (Island of Alsen). By J. H. Mansa. 1851. Scale 1 inch = 10 miles. 2 copies. Anastatized at the Topographical Depôt, War Office. 1864. Sir E. LUGARD, K.C.B.

Special Karte von Jütland. By A. Petermann. Scale 1 inch = 6·3 miles.
The AUTHOR.

Norrejyland Pl. 8th. Capt. J. H. Mansa. 1847. Scale 1 inch = 2½ miles.
Sir E. LUGARD, K.C.B.

g 2

Maps, Charts, &c. *Donors.*

Kaart over Slesvigs Fastland og Als. Scale 1 inch = 1·9 mile. Government Map. On 3 sheets. CAPT. C. IRMINGER.

North and South Slesvig. Scale 1 inch = 2·3 miles. A. PETERMANN, Esq.

Plan of Düppel with its fortifications. Scale 1 mile = 2 inches. E. STANFORD, Esq.

FRANCE—

Plan of the Military Operations near Bayonne, 1813-14. By Lieut.-Col. Macniven. On rollers. Sir R. I. MURCHISON, K.C.B.

GERMANY—

Karte von dem Grossherzogthume Hessen. Sections Herbsteen-Fulda and Erbach (Geological). 2 sheets. Scale 1 inch = 0·7 mile. DARMSTADT GEOGRAPHICAL SOCIETY.

Karte des Weser-Stroms, in 21 Sectionen, &c. By J. J. Vorloender. Berlin, 1863. Scale 1 inch = 0·3 mile. The PRUSSIAN GOVERNMENT.

GREAT BRITAIN—

Die Britischen Inseln und das Umliegeude Meer. Scale 1 inch = 1°. A. PETERMANN, Esq.

Railway Map of London and its Environs. By E. Stanford. 1863. The AUTHOR.

Map of London, showing the Metropolitan Railways and Miscellaneous Improvements. By E. Stanford, Esq. The AUTHOR.

ORDNANCE MAPS—1-inch scale—

England and Wales.

Sheets 92, N.E.; 98, S.W.; 102, S.E.; 103, N.W. and N.E.; 104, S.E.; and 105, S.E.

Scotland—

Sheets 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 30, 31, 33, 34, 40, 48, 49, 98, 104, and 105.

Ireland.

Sheets 4, 8, 12, 14, 17, 43, 54, 55, 77, 78, 81, 87, 88, 98, 104, 112, 172, and 182.

ORDNANCE Maps—6-inch scale—

England and Wales—

Sheets 18, 23, 24, 25, 30, 31, 32, 33, 34, 36, 37, 38, 39, 43, 46, and 47 (Co. Westmoreland).

...... 8 (Co. Durham).

Scotland—

Sheets 13, 16, 22, 30, and 31 (Co. Berwick).

...... 26, 35, 37, 54, 55, 57, 59, 63, 64, 66, and 68-69 (Co. Dumfries).

...... 22, 29, 30, 33, 34, 35, 36, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 55 (Co. Lanark).

...... 1, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19 (Co. Renfrew).

...... 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 25, 27, 28, 31, 32, 33, 38, 39, 40, 42, 43, 47-48 (Co. Roxburgh).

Ordnance Maps Indexes.

Linlithgowshire. 1 sheet.

Selkirkshire. 1 sheet.

The DIRECTOR of the ORDNANCE SURVEY.

Titles of Books. *Donors.*

HOLLAND—

Netherlands. Topographical Atlas. Scale 1 inch = 0·7 mile. Sheets, Nos. 4, 5, 9, 14, 49, 53, 54, 55, 56, and 57. T. SWART, Hon. Corr.

SWITZERLAND—

Carte des Postes, des Télegraphes, et des Chemins de Fer de la Confédération Suisse. Department des Postes. Scale 1 inch = 4·7 miles. Prof. J. M. ZIEGLER.

ASIA.

CHINA—

Diagram Map of China, on rollers, constructed by E. Stanford, F.R.G.S. Capt. SHERARD OSBORN, R.N.

Plan of the district around Shanghai, under the protection of the Allied Forces. 1862-3. Scale 1 inch = 2 miles. WAR OFFICE, Pall Mall.

INDIA—

The Great Trigonometrical Survey of India. 13 sheets, viz. Nos. 4, 14, 15, 46, 48, 56, 87, 104, 113, 115, 116, 121, and Index sheet. Scale 1 inch = 4 miles.

Atlas. Results of a Scientific Mission to India and High Asia, by Hermann, Adolphe, and Robert de Schlagintweit. Part III.

...... Buddhism in Tibet. Emil Schlagintweit. 20 plates. SECRETARY OF STATE FOR INDIA IN COUNCIL.

...... Scinde Railway, showing the general plan of the line. By John Brunton, Esq., C.E. to the Company. 2 copies. 1 inch = 4 miles. THE AUTHOR.

Outline Chart of Bombay Harbour, to accompany a Report on the better Lighting of the Port. By Capt. W. C. Barker, I.N. 1863. With Book of Directions. Scale 1 inch = 2 naut. miles. Capt. J. JENKINS, I.N.

JAVA—

Nieuwe tevens Etappe-Kaart van Java en Madoera ingevolge Gouvernements besluit ad 7 Augustus, 1860. No. 15. Scale 1 inch = 11 miles. By W. F. Versteeg. TOPOGRAPHICAL BUREAU, BATAVIA.

PERSIA—

Sketch-Map of the Gulf of Persia, to accompany a Paper by Colonel Pelly. COLONEL PELLY.

Route-Map from Herat to Meshed. V. Buck. F. GALTON, Esq.

Outline-Map of the Road from Bushire to Shirawz and Persepolis. Scale 1 inch = 10 miles.

AFRICA.

GENERAL—

Neuste Karte von Africa in 3 Blättern. By E. G. RAVENSTEIN. 1863. Scale 1 inch = 3°. THE AUTHOR.

Ancient Map: Oceanus Indicus Meridional Extrahido do Insilarium illustratum Henrici Martelli Germani. MS. do XV. Seculo, existente no Museo Brittanico. His Excellency CONDE DE LAVRADIO, Portuguese Minister.

EASTERN—

Eight MS. Maps, from Zanzibar to the Sources of the Nile. By Captains Speke and Grant. Scale 1 inch = 10 miles. CAPT. J. H. SPEKE.

Maps, Charts, &c. *Donors.*

Sources of the Nile. Tracing of an Ancient Map by Jerome Verrazzano. Original preserved at Rome. SIR R. I. MURCHISON, K.C.B.

WESTERN—

The Cameroons Mountains, showing the track of Capt. R. Burton from Victoria Mission-house to the summit of Cameroon Mountain. Scale 1 inch = 1½ mile. EDWARD WELLER, Esq.

AMERICA.

BRITISH—

Newfoundland, showing the Electoral District from Official Surveys. By J. Arrowsmith. 1857. Scale 1 inch = 17 miles (geo.) The AUTHOR.

UNITED STATES—

Degroot's Map of the Nevada Territory, exhibiting a portion of Oregon, &c. Published by W. Holt. San Francisco, 1863. Scale 1 inch = 12½ miles (stat.).

Official Map of the Washoe Mining Region, California, north-east of San Francisco. By R. M. Evans. Scale 1 inch = 10 miles (geo.) JOHN POWER, Esq.

SOUTH—

Stanford's Library Map of South America, constructed by A. K. Johnston, F.R.G.S., &c. Scale 1 inch = 83·25 miles (stat.). EDWARD STANFORD, Esq.

Mapa de la República de Bolivia, mandado Publicar por el Gobierno de la Nacion, &c. Por el Teniente Coronel Juan Ondazza. Ano de 1859. Scale 1 inch = 21·5 miles (geo.). C. R. MARKHAM, Esq.

Mapa Topográfica de la Altiplanicie Central de Bolivia. By Hugo Reck. 1860-1. Scale 1 inch = 31·2 miles (geo.). MR. LOWE.

AUSTRALIA.

Two sheets of Stieler's Hand-Atlas, viz.:—Sheet 50*a*, Western Australia and New Zealand—scale 1 : 5,000,000; Sheet 50*b*, Australia General —scale 1 : 10,000,000. By A. Petermann. 1864. The AUTHOR.

Chart showing Mr. M'Kinlay's Track across the Continent of Australia. 1862.

Map of Stuart's discoveries in the Continent of Australia, 1858 to 1862. By E. Weller. Scale 1 inch = 45 miles (Eng.). EDWARD WELLER, Esq.

NEW ZEALAND.

Geologisch-Topographischer Atlas von New Seeland, bearbeitet Dr. F. von Hochstetter und Dr. A. Petermann. Gotha. Justus Perthes. 1863. DR. F. VON HOCHSTETTER.

Map of the Province of Canterbury, showing the Pasturage, Runs, &c. From the Explorations of Dr. Haast and Dr. Hector. By J. S. Browning, Survey Office. Scale 1 inch = 10 miles (stat.). DR. JULIUS HAAST.

The Provinces of Nelson and Marlborough, &c. From Stanford's Atlas. Scale 1 inch = 8 miles (Eng.). Scale 1 inch = 9 miles (geo.). EDWARD STANFORD, Esq.

Map of the Gold-fields of the Province of Otago, from Official Surveys, &c. By J. T. Thomson, Chief Surveyor, 1864. Scale 1 inch = 45 miles (Eng.). 2 copies. The AUTHOR.

Map of the Seat of War in Auckland, published by the Editors of the 'Daily Southern Cross,' N. Z. Scale 1 inch = 2 miles. MR. C. GEORGE

Maps, Charts, &c. *Donors.*

Sketch of the Ground at Rangiriri, the scene of action, Nov. 20, 1864. Scale 1 inch = 440 feet. 2 copies. Lithographed at the Topographical Department, War Office. SIR E. LUGARD, K.C.B.

Map of the Neighbourhood of the Waikato River. Compiled at the Topographical Department, War Office. On 2 sheets. Scale 1 inch = 2 miles (Eng.). 2 copies. SIR H. JAMES, F.R.S.

ANTARCTIC.

Süd-Polar-Karte. Von A. Petermann. Scale 1 : 40,000,000. Justus Perthes. Gotha, 1863. The AUTHOR.

CHARTS.

ADMIRALTY—

Section 1.

No. 25. England, South Coast. Dodman to the Start.
262 *a b c.* Guernsey, Herm, and Sark (3 sheets).
618. Loch Boisdale.
2397 *a b c.* Scotland, North and East Coasts (3 sheets).
2814 *b.* Lochs Etive and Creran.
2905. East Loch Tarbert.
2909. Loch Awe (2 sheets, East and West).

Section 2.

No. 2250. Sweden. Sheet 5. Gottland.

Section 3.

No. 2260. Ports on the South Coast of Norway.

Section 4.

No. 151. Toulon Harbour.

Section 5.

No. 117. Straits of Messina.
194. Malta and Gozo Islands.
248. Harbour of Tripoli.
387. Port Maltezana (Stampalia Islands, Mediterranean).
515. Port Ali Agha.
2633. Markhab to Ras en Nakura (Syria).
2836 *a b.* Grecian Archipelago (2 sheets).

Section 6.

No. 281. Fleur de Lis Harbour (Newfoundland).
298. St. John's Harbour (Newfoundland).
334. Straits of Mackinac (Lake Huron).
340. Baccaro Port to Ram Point (Nova Scotia).
353. Bay of Fundy (Sheet 2).
375. Hamilton Inlet (Labrador).
407. Ports in Lake Huron (Upper Canada).
489. Catalina Harbour (Newfoundland).

Section 8.

No. 373. River Goazacoalcos (Mexico).
503. Admiralty Bay (Grenadines, West Indies).

Section 9.

No. 564. Espirito Santo Bay and Port Victoria (Brazil).
549. Port of Camamu (Brazil).

Maps, Charts, &c. *Donors.*

Section 10.

No. 516. Mangrove Bluff to Cape Corrientes (Mexico, West Coast).

Section 11.

No. 8. Chart of Red Sea. On 4 sheets.
639. Mossel Bay (Africa, South Coast).
688. Tamatave (Madagascar).

Section 12.

No. 514. Port Blair (South Andaman Islands).

Section 13.

No. 270. Simidsu Bay (Japan).
357. Harbours in Kü Channel (Japan).
359. Harbours on the West Coast of Kiu Siu (Japan).
361. Tambelan Islands (China Sea).
527. Iki Island (Korea Strait).
532. Simonosaki Strait (Japan).
1000. Pulo Condore Group (China Sea).
2562. Canton River.

Section 14.

No. 348. Australia, East Coast.
518. Shark's Bay (Australia, West Coast).
1081. George's Bay (Tasmania).
1937. Port Albany (Australia).

Section 15.

No. 134. New Hebrides Islands (South-west Pacific).
209. Solomon Islands.
350. Lord Howe Island and Ball's Pyramid (South-west Pacific).
480. Port de France (New Caledonia).
526. Teavarua Port (Raiatea Island, South-west Pacific).

The HYDROGRAPHER TO THE ADMIRALTY.

MISCELLANEOUS.

Two Ancient Maps on vellum, lithographed from an Atlas to Ptolemy's Geography of 27 Maps on vellum. Arnold Buckinck. Rome, 1478.

No. 1 shows Europe, Asia, and North part of Africa.
No. 2 shows Africa to 15° South latitude.

The Atlas is in the possession of H. Gurney, Esq.

H. GURNEY, Esq., F.R.G.S.

Five coloured Views of Free Town, Sierra Leone. By Ackerman and Co. London. PURCHASED.

Photographs:—North Atlantic Telegraph Expedition, 1860. Vale of Brattilid, Igaliko Fiord, South Greenland. (Parties starting to explore inland ice.)

.... Antarctic Expedition. H.M. ships *Erebus* and *Terror* in a gale in the pack, 20th January, 1842. From a painting by Captain R. B. Beechey, R.N.

Staff-Commander J. E. DAVIS, R.N.

Two Models:—The Lines of Torres Vedras, and Gibraltar. By R. T. Wilde and Sons.

INSTRUMENTS SUPPLIED TO TRAVELLERS.

To the late Mr. I. Duncan, Vice-Consul at Whydah, in 1849—

Telescope.
Two Compasses.
Aneroid Barometer.

Dr. P. C. Sutherland, M.D., F.R.G.S., at Natal—

Brass Sextant (7½-inch), with Silver Arc, by Troughton and Simms.
Strong-framed Artificial Horizon, by Troughton and Simms.
Two Barometers (Mountain), with Improved Iron Cistern, by Newman.

The late Dr. E. I. Irving, M.D., F.R.G.S., at Abeokuta—

Pocket Chronometer, by Barraud and Lund.
Barometer (Mountain), by Troughton and Simms.

Dr. D. Livingstone, M.D., F.R.G.S., Zambesi, Eastern Africa—

Sykes's Hypsometrical Apparatus, No. 1, with Sling Case, by Casella.
Standard Thermometers, 0 to 212, in Brass Cases, „
„ „ in Maroon Cases, „
Artificial Horizon, with Sling Case, „
Prismatic Azimuth Compass, silver ring, with leather Sling Case, „

Consul J. Petherick, F.R.G.S., Khartúm—

Compass, Prismatic Azimuth, by Troughton and Simms.
Chronometer, Pocket, No. 5150, by Barraud and Lund.
Horizon, Artificial, folding-roof, by Troughton and Simms.
Hypsometrical Apparatus, complete, by Casella.
„ three Boiling-water Thermometers, by Casella.
„ four W. B. Thermometers, by Casella.
Instruments, Drawing, pocket-set (Napier's), by Cary.
„ „ large set, by Cary.
Protractor, 6-in., ivory, by Cary.
Rulers, Parallel, 12-in., ivory edges, by Cary.
Sextant, 6-in., Platina Arc and Gold Vernier, &c., by Cary.
„ 6-in., Silver Arc, Ordnance pattern, by Casella.
Telescope, Achromatic, 3 feet 6 inches, by Troughton and Simms.
„ Binocular, complete with Case and Sling, by Cary.
Tripod Stand, adapted to Telescope, Sextant, &c., by Cary.
Quicksilver in Iron Bottle, 9 lbs.

Books—

Raper's Navigation.
Nautical Almanacks.
Blank Forms for Registering and Computation.

Dr. D. Walker, M.D., F.R.G.S., Russian America, Dec. 8, 1862—

Sextant, 4 in. radius, by Cary.
Artificial Horizon, Circular, by Cary.
Azimuth Compass, by Elliot.

Mons. Jules Gerard, Upper Guinea, towards Timbuktu, Feb. 4, 1863—

Sextant, 3-inch radius, by T. Jones.
Aneroid, white metal, by Spencer, Browning, and Co.
Artificial Horizon, spirit-level, by Elliot.
Boiling-water Apparatus, and three Thermometers in brass tubes.
Azimuth Compass, by Burnier.
Two small Pocket Compasses.
Protractor, brass, 2-in. radius.
(The above in Leather Case.)
Measuring Tape, 50 feet.
Thermometer, on metal, in Morocco Case.
Protractor, horn, circular.

PRESENTATION

OF THE

ROYAL AWARDS.

THE Founder's Gold Medal to Baron C. VON DER DECKEN, for his two surveys of the lofty mountain of Kilimandjaro, which he ascertained to be capped with snow, and to have an altitude of 20,065 feet. The Patron's or Victoria Gold Medal to Captain JAMES A. GRANT, for his journey from Zanzibar across Eastern Equatorial Africa to Egypt, in company with Captain Speke, and for his contributions to the work of that Explorer.

The PRESIDENT having called up the Baron C. von der Decken, thus addressed him:—

" BARON CHARLES VON DER DECKEN,

"This Medal is decreed to you for the two remarkable journeys which you have performed from the East coast of Africa to the great Mountain of Kilima-ndjaro, in each of which, with the assistance of Mr. Richard Thornton in the first and of Dr. Kärsten in the second, you made many astronomical observations, and constructed a contoured map of the region. You also determined numerous altitudes by barometrical measurement, and estimated the highest of the peaks of the mountains to be 20,065 English feet above the sea, and proved it to be covered with snow.

" In these expeditions you further collected rock specimens which have demonstrated that, in a remote period, this snow-capped mountain was an active volcano.

" The accuracy of the observations made in your last journey was proved by a comparison of the chronometers you took with you, which, having been compared on your return to Zanzibar, were found to have varied only 7" in 120 days.

" I further applaud your unabated zeal and energy in your present desire to explore the interior of Eastern Africa, inasmuch as you have just fitted out at great expense a new expedition, and have constructed a river iron-steamer wherewith you hope to ascend one of the rivers flowing from Mount Kenia, and thence to explore unknown regions, and if possible to follow down one of the main eastern affluents of the Nile. And, as you have named your new vessel the *Guelph*, I trust that this name, cherished by Englishmen who lived in the days when Hanover and England constituted, as it were, one country, may be a happy omen of the success which we all hope may crown your noble enterprise."

Baron VON DER DECKEN replied :—

"This is but the second time that I have had the honour of being present at a Meeting of the Royal Geographical Society. The first time, besides being kindly welcomed, I was elected an Honorary Member of the Society, and now a still greater honour is awarded me. It is quite impossible for me, as a stranger unfamiliar with the English language, adequately to express my thanks for the distinction. It is true, I always entertained a hope that, after returning rom my travels, I might perhaps have the good fortune to receive a Medal, a gift which every Explorer ought to look forward to as the highest testimonial of his work having been well and successfully done. Whether the journey for which I am now preparing will be a success, God only knows! But I have the firmest determination; and, if any accident should arise to myself during the expedition, I have made such disposition that my party (consisting of several able and scientific men) will be able to carry out my plans.

"Happy and proud as I am to-day, there is still some sadness mingled with it. I miss here my poor friend the late Richard Thornton, your countryman and my companion during my first excursion to Kilima-ndjaro. We did not at that time reach so great an elevation as I did in the second journey, in which, with the aid of Dr. Kärsten, I corrected the mistakes of the first. Thornton was nevertheless the first European besides myself who penetrated farther than the low hills surrounding the great mountain, and settled by his testimony the question of snowy mountains in Equatorial Africa. He was a good companion, and extremely useful during the expedition, by taking observations, working very laboriously with the theodolite, and as a geologist in collecting and describing the rocks. If I ever come back to Europe and publish an account of my travels, I shall not omit to give due credit to my lamented companion.

"In conclusion I feel it my duty to express publicly my best thanks to you, Sir Roderick, our distinguished President, who, from the first time I made your acquaintance, were so kind as to give me in every way assistance and good counsel regarding my new expedition, and who have used your influence to obtain for me the support of Her Majesty's cruisers as well as of the authorities on the African coast."

In presenting the Patron's Medal to Captain Grant, Sir Roderick thus addressed that Officer :—

"CAPTAIN GRANT,

"Eleven months have elapsed since we received your leader, Captain Speke, and yourself within these walls, with the cordial acknowledgment of the great services you had performed in opening out Eastern Equatorial Africa, and in showing how the White Nile flowed from the very lake previously discovered by your distinguished companion. Captain Speke having, on his arrival at Gondokoro, received the Medal most justly granted to him for the great discovery of Lake Victoria Nyanza, we, in conferring this Medal upon you, wish it to be understood that we once more emphatically mark our deep sense of the value of the first great exploration of those lands around it, made by Captain Speke and yourself.

"When you returned here our Anniversary had passed over, and both our Medals had been adjudicated, or you would, doubtless, before now, have received the highest honour which we have it in our power to bestow. It was, however, a source of true gratification to us to see that the King of Italy was, in the mean time, foremost in recognising your merit, as well as that of your skilful leader, and affixed to each of his Medals the appropriate motto of 'Honor a Nilo!'

"On my own part I can truly say that, on the many occasions in which it has been my lot to present Medals to Explorers of distant regions, I never had greater satisfaction than on the present occasion. For now that I hand to you this Medal, bearing the effigy of Queen Victoria, I feel that we Geographers are not merely recompensing the noble and disinterested companion of Speke, but, as a soldier of the olden time myself, I have a special pride in recognising in you the gallant young Officer, who, in the Indian mutiny, and despite a severe wound, was the means of saving from serious disaster the rear-guard of the illustrious Havelock, as he advanced to the relief of Lucknow.

"Accept, then, this, our gracious Patron's Medal, and consider it as our Victoria Cross."

Captain GRANT then replied:—

"Sir Roderick Murchison and Gentlemen,—It was during a recent sojourn on the Continent that I received the communication from the Council of the Royal Geographical Society, announcing that they had unanimously awarded me one of their Gold Medals of the year. I assure you the receipt of this communication gave me intense pleasure; but it was a surprise to me, for I little thought I had done anything to merit so high and distinguished an honour. And to receive the Medal from your hands, Sir, from whom I have always experienced so much kindness, enhances the value of a gift which I shall cherish to my dying day. I feel so much embarrassed by the distinction you have conferred upon me, that I am quite unprepared to express myself in the language I should wish. I hope, therefore, you will excuse the few words in which I thank you for the honour you have done me."

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 23rd *May*, 1864,

BY SIR RODERICK IMPEY MURCHISON, K.C.B.,

PRESIDENT.

GENTLEMEN,

In commencing this Address, which, for the reasons I assigned at the preceding Anniversary, I fully believed would be the last I should have the honour of delivering to you, I feel that, in addition to what has appeared in the Report of the Council, I ought to explain how it has happened that again a list has been prepared in which my name is proposed as your President elect for the ensuing year.

Let me assure you, Gentlemen, that my retirement had been completely arranged. With the advice of some of our leading members, I had, in fact, secured the services of a distinguished geographer and scholar, to be recommended as my successor, when unforeseen circumstances occurred which created disquietude in the minds of many well-wishers of the Society, if coupled with my retirement from office. Our excellent senior Secretary, Mr. Spottiswoode, having found it absolutely necessary, from the pressure of his other avocations, to retire, and our new Assistant-Secretary, Mr. Greenfield, having recently met with a premature death, the Council laid before me their unanimous request, that in this difficulty, and with a new staff to be appointed, I would consent to continue in office. As nothing could induce me to leave the good geographical ship, to which I am so heartily attached, in a moment of distress, so, in the belief that I may be able to steer her for a time, I have consented to remain at the helm for one year, if such should prove to be the wish of the Society. You therefore, Gentlemen, if you choose me once more, must take upon yourselves the responsibility of re-electing your weather-beaten chief, who on his part can only assure you that, if you do so, he will put forth in your cause whatever energy is left in him.

In the mean time I may say that the losses in our staff have been well made up; for whilst our accomplished Secretary, Mr. Clements Markham, remains, Mr. Laurence Oliphant, the well-known traveller in many countries, takes the place of Mr. Spottiswoode; and the post of Assistant-Secretary is already occupied by a true traveller and good geographer, Mr. H. W. Bates, the author of that popular and instructive work, 'The Naturalist on the River Amazons.' The man who, in pursuit of the beauties and truths of natural history, has spent eleven years of his life in regions known to few Europeans, and who has since published so striking an account of them, will, I anticipate, be found to possess all the qualities of a good Assistant-Secretary and Editor of our publications.

Since our last Anniversary we have made an addition to our members of eighteen distinguished geographers of foreign lands, as mentioned in the Report of our Council; and in this act we have not only honoured ourselves, but have greatly augmented our means of obtaining the best and freshest knowledge of the advances of our science in France, Germany, Switzerland, Russia, South America, the United States, Portugal, and Denmark.*

In former years I have had, as I now have, the satisfaction to announce that the numbers of our ordinary Fellows have increased, and are increasing, and that our losses by death have been small in comparison with the great accession of new Fellows. In fact, the elections made in two of our ordinary days of meeting would replace the whole number we lose by death during the year. If this prosperous, flowing tide should continue, we may really reach that stage of augmentation for which no place of meeting would suffice, and then we may be obliged to limit our numbers, and fill up the annual vacancies only.

OBITUARY.

I naturally commence the record of the losses we have sustained in the deaths of our Associates with a notice, however brief, of that good and well-beloved man, my immediate predecessor, the late Lord

---

* See Council Report, Appendix E, p. xxv.

ASHBURTON. Born in the last year of the last century, William Bingham Baring succeeded to his father, the first peer, the great merchant prince Alexander Baring, whose name is bound up in geographical annals, as having been the chief British Commissioner, assisted by Colonel Mudge, R.E., and my friend W. G. Featherstonhaugh, in settling the boundary between the United States and British America. Receiving part of his education in Geneva, he gained good classical honours at Oxford, where he was a member of Oriel College, and where under Whately, the late Archbishop of Dublin, and Davison of Oriel, he acquired that taste for general knowledge which he ever retained. During the administration of Sir Robert Peel, and when a member of the House of Commons, he occupied the official posts of Secretary of the Board of Control, of Paymaster of the Forces, and of Treasurer of the Navy.

As soon as he became possessed of the title and the great landed estates of his father, Lord Ashburton was enabled to exercise liberally his love of true beneficence; and on numberless occasions he quietly and unostentatiously, but zealously, occupied himself in acts of well-considered encouragement of merit, and in countless works of charity; whilst his exertions to improve the education and condition of the humbler classes were unceasing.

In his capacity of President of this Society, I had perhaps more opportunities of estimating his hearty devotion to our cause than most of my Associates, and I can sincerely declare, that nothing but ill health ever prevented his personal attendance at our meetings; and that even when pressed by illness, his thoughts were anxiously directed to our well-being and advancement. When able to be among us, his elegant and appropriate Addresses, his genuine friendliness, and participation in our proceedings, endeared him to all the Fellows of this Society. It has been incorrectly stated that he resigned his office on account of ill health; for, threatened as he was with the malady which ultimately proved fatal, he strove to do his duty throughout his biennial term of office. As his malady increased, his health underwent so great a change for the worse, that but for the unremitting and soothing attentions of the devoted and accomplished lady who mourns his loss, his life could not have been protracted as it was to the 23rd of March last.

In short, our late President was a man of so guileless and honourable a stamp, that no one could have had much intercourse with him without loving him; and those who knew him best will join with me in asserting that few men of our generation have passed through life more usefully or blamelessly, or left behind them truer feelings of regard and affection, than William Bingham Lord Ashburton.

Rear-Admiral John WASHINGTON, C.B., F.R.S.—In the year 1858 it was my province, in reviewing the meritorious life of that eminent hydrographer and noble character, Rear-Admiral Sir Francis Beaufort, to solace my Associates with the reflection, that the British Navy and this Society hailed a most worthy successor in our former Secretary, Captain Washington. Alas! he also has now been taken from us. Born in 1800, John Washington entered the Navy in 1812, and saw much active service in the frigate *Juno*, in the waters of the Chesapeake and on the American coasts. Afterwards, in the *Sibyl* frigate (Capt. Forrest) he was occupied in pursuing the American Commodore Rogers up to Spitzbergen. In this voyage he acquired much scientific knowledge under the then master of the vessel, afterwards Sir W. Bain, in making astronomical and magnetical observations. Following up this knowledge in the Royal Naval College at Portsmouth, he there obtained a prize gold medal in 1816; after which he served three years in the *Forth*, both on the North American Station and in the Pacific. While on this last service he nearly lost his life through a sailor's falling upon him from the mast, and throwing him senseless into the sea, from which he was only rescued by extraordinary efforts.

When appointed Lieutenant in 1821, and obtaining leave to come home, he disembarked at Valparaiso, and crossed the Andes to Mendoza, riding over the Pampas to Buenos Ayres. Returned to England, he was transferred to the *Parthian*, and passed two years in the West Indies; and afterwards, obtaining leave, he travelled in France, Spain, and Italy, improving himself in languages. Going to sea again in 1827, he was four years afloat in the Mediterranean, in the *Weasel* and the *Dartmouth*; and during this service he explored the interior of Morocco in company with the English Consul-General Drummond Hay, making astronomical observations in his route, and fixing the true position of places hitherto undetermined. A memoir containing these observations was a communication to our Society in the first year of our existence, and published in the first volume of our Journal.

Constantly occupied in useful studies, he obtained the rank of Commander in 1833, and was ever active in promoting the success of our then young Society, when, in 1836, he succeeded to our first Secretary, Commander Maconochie. Once placed in that office, I well recollect what vigour he infused into all our proceedings, whether in stimulating important travels and enterprises, or by greatly improving our publications, in the editing of which he laboured assiduously, assisted only by a single clerk. It was he, indeed, who introduced among us the practice of annually reviewing the progress of geography in the past year, a practice which was not adopted by our Presidents until that distinguished scholar the late Mr. William R. Hamilton set the example in 1839. I am reminded by the eloquent and admirable sketch of his life by M. d'Avézac that a very important anonymous suggestion made by Washington, and signed A. Z., which was addressed to the President and Council of the Royal Geographical Society, and suggesting the Antarctic Expedition of James Ross, was never printed, though it was recorded in the Bulletin of the French Society. After five years of invaluable services to this Society, Washington, in 1841, took the command of the *Black Eagle*, in which ship he brought the late King of Prussia to England. My friend, Baron Alexander von Humboldt, being the King's chief adviser, the favourable impressions produced on the mind of the illustrious traveller by the knowledge and acquirements of the ex-Secretary of the Geographical Society were such that, on the recommendation of that Sovereign, Washington obtained the rank of Post-Captain. Up to the year 1847 he was employed as a Nautical Surveyor in the *Blazer*; and on many parts of our own coasts he set that example of scrupulous exactitude of observation which had been duly impressed upon him by his revered chief, Beaufort, to whom in 1855 he succeeded as Hydrographer of the Admiralty. In this new post, following the bright example of Beaufort, he introduced the same spirit of action and order which he had so efficiently applied to the improvement of our Society, and was a thoroughly conscientious, indefatigable, and clear-headed Director of that laborious office. In it, besides compiling for us annually that excellent résumé of all the British Nautical Surveys of each year, which forms so highly valuable a portion of our Journal—which is now continued through the goodwill of his successor, Capt. Richards—Washington lost no opportunity presented to him by his official position, of rendering us essential service in promoting every geographical expedition of importance. Deeply imbued, like many a gallant seaman, with the profoundest sense of the obligations and duties of a Christian, he had all along taken the liveliest interest in every exploration of Africa which might tend to the improvement of the natives and the abolition of the trade in slaves. It was therefore with especial zest that he backed up Livingstone when the latter had resolved to execute his second journey; and it was chiefly owing to the energy of Washington that the bold traveller was furnished with the steam-vessel by which the ascent of the Zambesi river was to be accomplished, though the expense of fitting out a vessel drawing less water for the ascent of the river Shiré fell entirely upon Livingstone. Nor had Washington been less conspicuously and untiringly active in supporting Lady Franklin through all her efforts in search of her missing husband; and if others had been as true-hearted in that cause as those lamented men, Beaufort and Washington, that heroic lady would not have been left to spend her own fortune in doing that which it was the bounden duty of the country to have accomplished. From repeated conversations on this subject with both of these eminent men, I know how truly they grieved with myself on the loss of national dignity and right feeling which that apathetic conduct involved.

Admiral Washington was one of those men of highly nervous temperaments, and feeling hearts, who inevitably fall victims to their zeal and sensibility, whilst duller men plod on and live. Exhausted by over-exertion in his office, he obtained leave of absence to travel on the Continent, in the hope that his shattered health might be restored; and with this object he repaired to Havre. There he made at first some progress, particularly when reanimated and rejoiced by the arrival of his second son, Henry Halford, from the Chinese station; when suddenly he was struck down by an order that the youth should sail to the Pacific. With natural impatience he hastened, ill as he was, to London, to try to avert his disappointment; but having failed, his despondency and ill-health increased, so he wandered into Switzerland on a forlorn-hope, and only returned to Havre to die in the sixty-third year of his age, happily attended by his affectionate wife and his youngest son, Francis Palmer.

With the sincerest regard for the personal character of Admiral Washington, and the deepest sense of the great services he rendered to this country, and to this Society in particular, it is indeed most gratifying to reflect that ample justice has been done to his memory by our distinguished Foreign Member, M. d'Avézac, in a notice of his life and works, read before the Geographical Society of Paris; whilst the honours which were paid to his remains by all the authorities, as well as by the inhabitants of Havre, on the occasion of his interment, will never be forgotten by the numerous friends of John Washington. This is indeed one of those kindnesses which will the more link us on in bonds of continued friendship with our powerful allies and worthy rivals, the French. Admiral Washington was a Fellow of the Royal Society, and of many scientific and philanthropic establishments.

PORTLOCK.—By the decease of Major-General Joseph Ellison Portlock, of the Royal Engineers, our Society has lost a truly sound geographer. He was the son of Captain Nathaniel Portlock, R.N., who circumnavigated the globe in the days of Captain Cook, and died one of the Captains of Greenwich Hospital. His son, who was born at Gosport in 1794, was educated there and at Tiverton, and finally at the Royal Military Academy at Woolwich. Young Portlock obtained his first commission in the corps of Royal Engineers in 1813. In 1814 he was sent to Canada, where he served till September 1822, and took an active part in the war with the United States. He was at the siege of Fort Erie, and, when the army retreated, was the engineer who constructed the lines and *tête-de-pont* of Chippewa, at which Sir Gordon Drummond made his successful stand and saved Upper Canada. After his return from foreign service Lieutenant Portlock was appointed in 1824 to the Ordnance Survey, then under the direction of Colonel Colby,* and was one of the assistants of that able officer, in companionship with Lieutenants Drummond and Larcom, in preparing the materials for the measurement for the base of triangulation. Accompanying Colonel Colby to Ireland, he worked with the Trigonometrical Surveyors on Divis Mountain, near Belfast, where the first observations of distant points were made with the heliostat, then recently invented by Lieutenant Drummond, R.E., afterwards Under Secretary for Ireland. Becoming the leader of the trigonometrical branch of the survey in Ireland, Portlock underwent great hardships on the bleak coast of Donegal, in one part of which, though two of his soldiers perished, he perseveringly held on until he brought his observations to a successful issue. Completing the triangulation on various Irish mountains, he remained, in 1827, under canvas at heights of 2000 feet above the sea, till the middle of January. Up to that time he had been accompanied by Lieutenant, now Major-General, Sir Thomas Larcom, K.C.B., at present Under Secretary for Ireland, but thenceforward he continued his

* See my sketch of Colonel (afterwards General) Colby's eminent services, in the Address of 1853, when I presided over the Society. Vol. xxiii. p. lxix.

labours single-handed. In short, he indefatigably pursued his observations with the great theodolite in all the chief mountains of Ireland, until the network of the principal triangles was completed; whilst by observations across the Channel, mainly effected by the employment of heliostats, the Irish triangulation was united with that of England and Wales.

Portlock also undertook the laborious duty of correcting the discrepancies which arose between the established points of the great triangulation and the junctions of the detailed work of the field-surveyors, and, provided with assistants, he so advanced these operations that in one year two millions of acres were completely surveyed. With such ceaseless labour in observation, calculation, and horizontal triangulation, Portlock united an elaborate system of vertical measurements. The altitudes were first deduced from the level of the sea by actual levelling to bases of altitude, and from those bases transferred, by angles of elevation and depression, to the summit of every mountain, hill, and station, at distances averaging a mile asunder, on which the minor levellings of the detail survey depended. This also was at first performed in the separate districts, but ultimately generalised into a system. With this view, Portlock personally carried a line of levelling across Ireland, from the coast of Down to that of Donegal, and caused similar lines of levelling to be observed in other places. The result was, to furnish a more general and homogeneous series of altitudes than had ever before been accomplished. It is true that even the accuracy thus obtained proved insufficient for those increasing wants and that improved knowledge which the scientific works of the day soon afterwards called for, though his contributions went far beyond the original intention and requirements of the survey as contemplated by Parliament. Those wants were also met and supplied in Ireland by an elaborate system of special spirit-levelling, crossing the island in every direction, and terminating at stations on the coast, where tidal observations were simultaneously made. These observations were thoroughly executed by Captain Cameron, who had been trained chiefly under Portlock; and they furnished the material for the admirable paper by the Astronomer-Royal, published in the Transactions of the Royal Society of London.

The triangulation and altitudes of all Ireland being completed, Portlock was employed to carry out the views which Colonel Colby had formed at the commencement of the survey in regard to a geological survey of Ireland, but which the more pressing wants of the topographical branch had caused to be suspended. For that work, on which Portlock's abilities might have been equally developed, the time was past for making it a part of the survey, and, after a single volume had been published, other public arrangements were made, and the Geological Survey of the British Isles was established under Sir Henry de la Beche. It is, however, my bounden duty, as a geologist, to state that this volume of Portlock on the geology of Londonderry is a perfect model for fidelity of observation and minute attention to phenomena.* To the quickness of his eye, and his resolution to surmount difficulties, we also owe the first detection in Ireland (Tyrone) of those trilobites and other organic remains which enabled him to identify those rocks with the Silurian rocks of England and Wales very shortly after my first classification of these older palæozoic rocks. In short, he not only described the physical and mineralogical features of those tracts, but even so correctly described and named all their imbedded organic remains, that his work will always be considered one of those stock pieces of science to which geologists are largely indebted. On many occasions, as he rose in rank from captain to field-officer, Portlock showed, not only so a great a love for geology, but also so true and solid an acquaintance with the science, that in the years 1857 and 1858 he was elected to occupy the chair of the Geological Society of London; in which he was not only distinguished for his sound judgment and courtesy as a President, but also for the faithful and elaborate research shown in his Anniversary Addresses. He was, in truth, a geologist quite after my own heart; for in him an acquaintance with rocks, minerals, and fossils was united with the full knowledge and feeling of a true physical geographer.

When his duties as a trigonometrical surveyor were completed, Portlock reverted to the active military duties of his corps, and was employed as Commanding Engineer at Corfu in the erection of the fortifications now in process of demolition. Afterwards he commanded the Engineers at Portsmouth and at Cork. In 1853, much to his honour, he wrote a memoir of the life of his old chief in the Ordnance Survey, General Colby, whose modesty had prevented his rendering justice to himself, who had done so much and

* In 1858, Portlock acted as President of the Geological Section of the British Association at Belfast.

said so little of his deeds. Subsequently General Portlock became the Inspector of Studies at the Royal Military Academy at Woolwich; and, lastly, a member of the Council of Military Education. Failing health—the result, doubtless, of his extraordinary labours—bringing on paralysis, and compelling him to resign the last-named office, he returned to a pretty spot near Black Rock, Dublin, called Lota; where, soothed by the attentions of his devoted wife, he died on the 14th February, 1864.

For much that is given in this sketch of my lamented friend I am indebted to his distinguished brother Engineer officer Major-General Sir Thomas Larcom, with whom I cordially agree in thus summing up our estimate of the man:—"The characteristics which shone forth in Portlock during his well-spent life, whether as a soldier, a geographer, or a geologist, were,—undaunted courage in facing difficulties, Spartan endurance and invincible perseverance in overcoming them. Endowed, when in the zenith of his career, with a frame and nerves of iron, he exhibited such a vast power of continuous labour that he achieved every object he had in view; whilst great ability and a pure love of knowledge were in him guided and governed by the highest sense of honour and moral rectitude."

General Albert de La Marmora.—Our list of Foreign Members has in the last year been deprived of the name of one of those brave soldiers of whom Italy has reason to be proud, and who, in the latter part more especially of his distinguished career, has been a most devoted and successful contributor in the advancement of geography. Albert de La Marmora, who died last year at Turin in his 75th year, and was born at the same place in April, 1789, was the second born of eight brothers of an ancient noble family, four of whom became distinguished General Officers. Entering the military service when the North of Italy was united with France under the First Napoleon, his education was completed at the Military School of Fontainebleau, in which he was well instructed in mathematics by the famous Puissant. After some years of local adventure he served in the army which, advancing from Italy, retrieved the defeat of Aspern; and he fought in the great victory gained by the first French Emperor at Wagram. Although a serious malady compelled him to leave the army in 1811, he was called again into activity, and, taking part in the battles of Lutzen and Bautzen, he obtained the Cross of the Legion of Honour. He was also engaged in the disastrous battles of Gross Beeren and Leipzig; and, when the star of Napoleon set in 1814, La Marmora, returned to his native city, still holding, after eight years of hard service, the rank of Lieutenant only. Our own fine old soldier, Lord Clyde, was, in a similar way, long an unknown brave subaltern.

In the year of peace which followed the short war of 1815, his active spirit led Albert de La Marmora into liberal demonstrations, which caused him to be exiled to the Island of Sardinia. This event, which seemed untoward, proved however to be most beneficial to geographical science. It threw this zealous man upon his own resources, and he began to work out the geography of an island, which, though it gave for a long period a title to a crowned head, had been hitherto quite misrepresented in the scientific maps of European countries. In subsequent years, regaining his freedom and proper position, he advanced to higher rank and occupied public stations of importance; among which was the Directorship of the Royal Naval School at Genoa. An active adherent of the gallant but unfortunate Charles Albert, he received from that King, shortly before his abdication, the rank of Lieutenant-General; and under the present King of Italy was decorated with high honours.

Having thus briefly sketched his public career, it is now my duty to unite, as your representative, with the Geographers of France and Italy, and I trust of every country of the civilized world, in doing honour to the memory of the man who devoted his best energies for many years to the completion of that beautiful map of Sardinia, for the construction of which we placed him in the list of our Foreign Members. This work is not only an example of accurate and skilful workmanship, in the representation of a tract highly diversified in outline, but has been admirably illustrated by the well-filled volumes which he published on the Natural History, Antiquities, and Geology of his favourite island, so that the labours which he commenced in 1819 were not really terminated until 1860. Whilst my eminent contemporary M. d'Avézac, in his Address to the Geological Society of France, speaks with the warmth of a friend and admirer of General Albert de La Marmora for his description of the Antiquities of Sardinia, let me assure you that at a late period I also rejoiced to converse with the deceased General, when I found that he was as zealously intent upon doing all justice to the geological structure of the island. Not content with consulting M. de Verneuil and myself as to the age of the rocks he was describing, he employed competent persons, particularly M. Vecchi, in drawing and describing all the fossil organic remains. In short, he has by his encyclopædic and praiseworthy labours so united Sardinia with Piedmont, as thereby to constitute the strongest reason, independent even of the rights of regal inheritance, why the race of inhabitants of that fine island should never be severed from the Italian kingdom. It is as a benefactor to humanity in its widest sense that the memory of this true devotee to the cause of science and letters will be preserved to future ages, when the names of many a greater official personage of our time will have passed into oblivion.

The Earl of Elgin and Kincardine.—The late Earl of Elgin was a Fellow of our Society, and it is but a brief time since you heard his voice in this room, unostentatiously describing the results of those great events which have revolutionised the relations between the European world and the most remote and most civilised empires of Asia. The late Earl, born in 1811, was educated at Eton and Oxford, and was the friend and contemporary in years with such statesmen as Lords Dalhousie and Canning, and William Gladstone.

With a slender patrimony, and no other advantage to begin life than an ancient Scot's pedigree, Lord Elgin fought his way to eminence by force of talents, assiduity, and integrity, and was truly the builder of his own fortune and renown. Diplomacy was the branch of administration, including colonial administration, in which he rose; and here, from the magnitude and importance of the transactions in which he happened to be engaged, but still more from the skill with which he conducted them, he is entitled to rank among the first diplomatists of our time. His first responsible office was that of Governor of Jamaica, from which he was transferred to the more important and difficult office of Governor-General of Canada, which he discharged with skill and efficiency, conducting to a successful issue those negotiations with our frontier relatives, which, founded on the solid bases of freedom, justice, and equality, ought to insure peace and contentment to the parties concerned. But by far the most valuable services which Lord Elgin rendered to the State were those which he achieved in China and Japan. The first mission to China began in 1857, and lasted two years; the second began in 1860, and terminated in the same year; so that in all, between China and Japan, he passed three years of most laborious and responsible employment. This successful diplomacy has thrown open to us four new ports in China, and as many in Japan. You can judge to what extent we are already profiting by his Lordship's services, when I state that the value of the exports and imports of Britain and her Colonies with the two empires already reaches the yearly sum of 40,000,000*l*.

Such services as these will assure to Lord Elgin a record in our national history.

The operations which have led to these great results gave the Earl of Elgin an opportunity of displaying that self-reliance, promptitude of action, and political courage, which eminently distinguished his character. The news of the outbreak of the great Indian rebellion having reached him on his route to China, he at once appreciated the extent of the danger, and, on his own responsibility, diverted the whole naval and military expedition from its original destination. By his command, the force which was meant for the Peiho proceeded to the Ganges, and largely contributed to the suppression of the insurrection; for it was in time, not only for the protection of Calcutta, but for the capture of Lucknow. In this last crowning achievement, performed at the distance of 600 miles out of the bounds of their own special element, even the Navy took part; for who can forget the part played in it by the gallant William Peel and his sailors?

Shortly after his return from China, Lord Elgin was promoted to the most lucrative, but also the most difficult and responsible, office under the Crown—the Government of India; and assuredly none of his predecessors brought to it so large and various a practical experience, while in talents he equalled the most distinguished of them. Had his life been spared, his talents, energy, and industry would have been equal to the cultivation of the grand field which was now opened to him. He proceeded to India in 1861, and died at his post in 1863, at the age of 52, much too early for his country and his friends; the malady which proved fatal to him being an organic affection of the heart—without doubt, the effect of long, laborious, and anxious public services on a peculiarly sensitive constitution.

In dying at his post in India, this eminent public servant was spared the misery which befell his predecessor, Lord Canning, in the loss of his wife; for, happily, the accomplished Countess of Elgin, who had devotedly followed her lord to the East, has survived, and will doubtless so bring up her children as to lead them to emulate the great deeds and virtuous life of their noble parent.

The death of the Admiral of the Fleet brings me to notice, however briefly, one of the distinguished seamen of Nelsonian days. Sir W. Hall Gage, G.C.B., entered the Navy in 1789. He was present as Lieutenant of the *Minerve*, under the command of Lord Nelson, when that vessel captured the Spanish frigate *Sabina*. He next took part in the cutting-out of the *Mutine* from under the batteries at Teneriffe. When in command of the *Uranie*, the boats of that vessel, in company with those of the *Doris* and *Beaulieu*, cut out the French National ship *La Chevrette*, of 20 guns and 350 men, which was considered one of the most brilliant exploits of the kind ever performed. He served as Commander-in-Chief in the East Indies from 1825 to 1830, and on the Lisbon station from 1834 to 1837; and from 1842 to 1846 he acted as Senior Naval Lord at the Board of Admiralty. Sir William joined the Royal Geographical Society in the year 1845.

Rear-Admiral Octavius VERNON HARCOURT, fourth son of the late Archbishop of York, entered the Navy in 1803, and in the *Calcutta* performed a voyage round the world in 10 months and 3 days, which at that period was thought a very remarkable feat. He served as a Lieutenant in 1809, in the Baltic, with distinction; and in 1813, when in command of the *Challenger*, took part in the siege of San Sebastian, and afterwards commanded the *Blossom* and *Doris* on the South American station. Admiral Harcourt took an active interest in many charities, and at his death bequeathed a large sum of money for their maintenance.

Rear-Admiral FOWLER entered the Navy in 1793, and sailed as Lieutenant with Captain Flinders on a voyage of discovery to New Holland. He was afterwards wrecked on the Cato Reef, when in command of the armed storeship *Porpoise*; but he ultimately succeeded in reaching Canton, where he embarked on board the *Earl Camden*, East Indiaman. In consideration of the assistance that he afforded to Captain Dance in beating off the powerful French squadron under Linois, he was presented by the East India Company with a sum of 300*l.* to purchase a piece of plate, and the Patriotic Society awarded him a sword. He served in Sir R. Calder's action, 1805, and took part in the expedition to Walcheren, 1808.

Captain William ALLEN entered the Navy in the year 1805. He served in the *Standard* at the passage of the Dardanelles, under Sir Thomas Duckworth, and was engaged in the reduction of Java.

Captain Allen served in the *Wilberforce* steamer on her memorable expedition up the Niger, of which he published an interesting account; and in the year 1855 he produced a work in 2 vols. on the 'Dead Sea and the Overland Communication with the East.' In this he advocated the cutting of a canal so as to admit the Mediterranean into the Dead Sea, and entered extensively into a comparison between this route and that by the proposed Suez Canal. Captain Allen took an active part in the proceedings of the Society, and spoke occasionally at our meetings.

Captain W. A. WILLIS entered the Navy in 1811. He served as Flag-Lieutenant to Sir G. Cockburn, in the West Indies, and afterwards in command of the *Jaseur* and *Frolic;* and in 1845 he was granted a pension for wounds received in the service.

Richard THORNTON.—I have now to speak of a gifted and promising young man, Mr. Richard Thornton, of Bradford, who has lost his life by his zealous exertions to extend our acquaintance with the geography and geology of Eastern Africa. I am proud to say that Richard Thornton received his scientific education in the Royal School of Mines, over which I preside, and that, being desirous of accompanying Livingstone in his last explorations, I confidently recommended him to the good will of the great traveller. When Livingstone last left our shores in March, 1858, young Thornton, then only nineteen * years of age, accompanied him as geologist. Qualifying himself during the voyage and at the Cape of Good Hope in making astronomical calculations, and being also a good sketcher of ground and capable of constructing maps, he was as well adapted to lay down the physical geography of the Zambesi River as to describe the various rocks which occupied its banks.

In looking over his accurately-kept diaries, in which he never failed to register every fact, I find that he made upwards of 7000 observations, to fix relative geographical points and to determine altitudes, on the banks of the Zambesi. In leaving the tertiary rocks of the Delta behind him, and in ascending that river to the rapids, he described numerous rocks of former igneous origin; and, still further inland, various seams of thick and good coal (of which the Portuguese may very largely avail themselves); proving, by the associated fossil remains, that the coal was of the old and best age of that mineral.

His health having failed, he was for a while estranged from the Zambesi expedition, through a partial misunderstanding between his chief and himself. This having been completely done away with, when my young friend returned to work out and complete his labours in the Zambesi region, I should not here allude to it, if not to recount the important services he rendered in the mean time to

* Born 5th April, 1838.

geographical and geological science, by becoming *ad interim* the scientific companion of Baron C. von der Decken, in his first survey of the Kilima-ndjaro Mountain, from Zanzibar and Mombas.

Having recently examined the diary kept by Mr. Richard Thornton in that journey between Mombas and the highest point the travellers reached, and also on their return to Mombas, or between the last days of June and the 10th of October, I have no hesitation in saying that the labour is so graphically detailed, every movement so accurately recorded, the transactions with the various native tribes so clearly explained, and every hour of the 120 days' expedition so well accounted for, that, with the contoured map of the region which he prepared, together with many sketches of the form of the ground, I can really fancy myself, like his leader and himself, struggling to reach the snowy equatorial summits. The numerous obstacles opposed by the native chiefs, and the manner in which, after so many "showrys" or palavers, all difficulties were overcome; the perfect description of the habits and dresses of the natives—of the metamorphosed structure of the rocks—the vegetation of each zone of altitude—all these are given; whilst every moment of clear weather in that humid region was devoted to star and lunar observations, or to theodolite measurements of altitude, and the fixing of relative geographical points. All this, too, was scrupulously performed by Thornton, notwithstanding occasional attacks of fever, to which the Baron and himself were subjected.

I cannot but hope that these diaries of an accurately minute philosopher, or at least large portions of them, will appear in print; for I have read few writings more instructive and characteristic. In fact, until Baron von der Decken and Thornton carried out this expedition, no other African traveller has ever had presented to him such a vast variety of scenes of nature, within so limited a compass, as those which are seen in ascending from the eastern seaboard to the banana groves on the skirts of the snow-clad peaks of Kilima-ndjaro. As the account of this first ascent has been given to Continental Europe in German, so we may rejoice that our Thornton's English version of the same may soon appear; whilst Baron von der Decken, our Medallist of this year, unites with me in the expression of admiration of the undaunted efforts and able assistance of his companion.

In truth, in his letters to myself, besides what is noted down in his diaries, Thornton correctly described (and for the first time) the nature of each rock of that region; by which I clearly learned that igneous rocks, whether syenites or porphyries, had penetrated micaceous slaty metamorphic strata, and that streams of vesicular lava, which occur on the flanks of the mountains, indicated clearly that the loftiest summits, now capped with snow, had been raised by the extrusion of a great subaërial volcano.*

If his life had been spared, this fine young man intended, as he wrote to me, to endeavour to traverse Africa, and compare its East and West coasts with each other, as well as with its vast lacustrine centre. Anxious, however, to finish off in the mean time those labours in the Zambesi which he had so far advanced, he rejoined his old chief Livingstone, and was on the point of completing the map of a mountainous tract on the north bank of the stream, when, in over-exerting himself, he fell a victim to that fever which has proved so fatal to our missionaries, to the devoted wife of Livingstone, and which, on more than one occasion, has nearly deprived of life that great traveller himself.

One of his companions for a time on the Zambesi, the Rev. Henry Rowley, in writing to me of the never-flagging zeal and unconquerable energy, as well as of the generous nature and high character of Richard Thornton, adds:—"Axe in hand, he would cut himself a path to the top of a thickly-wooded mountain, never leaving it till the setting sun made further observations impossible."

In reviewing the journals and diaries of Richard Thornton, I am lost in admiration of his patient labours of registration, when combined with his vivacity of description. With such a delineator in words as Thornton, and such an artist as Mr. Baines—who has sent home such admirable coloured drawings of South-African scenes, particularly of the falls of the Zambesi—those of us who are destined never to be able to penetrate into the southern part of Africa, may quite realise to our mind's eye the true characters of that grand continent. Through the devotion of the brothers and sisters of the deceased traveller, the whole of his voluminous notes and observations have, I am happy to say, been carefully copied out and transmitted to us; and I am confident that every one who examines them will declare with myself, that Richard Thornton was so gifted and rising an explorer, that, had he lived, his indomitable zeal and his great acquirements would have surely placed him in the front rank of men of science. He died on the 21st April, 1863, at the early age of twenty-five years.

---

* In the subsequent expedition, when Baron von der Decken reached the greater altitudes, he found in addition trachytes and obsidian.

E. Osborne SMITH.—By the decease of my respected friend, Mr. E. Osborne Smith, the Council has lost a valuable auxiliary, whether in the management of our finances, in preparing the annual Reports, or in every way rendering himself useful. Possessed of sound good sense, and endowed with a most genial disposition, he was truly an important link between the popular and scientific portions of our large body; and on numerous occasions was of real service in calming irritation and in promoting harmony and goodwill among us.

As the Treasurer of the Club of the Society, his cheerfulness and large-heartedness rendered him a general favourite; and all its members have united with me in deploring his loss, whilst they cherish the memory of his good deeds. He had been for many years the Actuary of the Reliance Life Assurance Company, which office gave him full opportunity of displaying his mathematical abilities; and it is believed that the laborious work of computing a long series of important and intricate calculations brought to a crisis the illness that terminated his well-spent and useful life.

Mr. Osborne Smith was a Fellow of the Society of Antiquaries, and also of the Zoological, Statistical, and Ethnological Societies; and was a member of Council in the two last bodies, as well as in that of our own Society. He died on the 25th April, 1864, in the sixty-fifth year of his age, deeply regretted.

Beriah BOTFIELD.—Beriah Botfield, M.P., was a man of cultivated mind, who expended much of his large fortune in the promotion of antiquarian researches, and in the publication of literary works of merit. The chief of these works are—various Tracts upon Bibliography, communicated to the Philobiblion Society; Prefaces to the first editions of the Greek and Roman Classics, and of the Sacred Scriptures; Stemmata Botevilliana; Expenses of England in the 13th and 14th centuries; and Notes on the Cathedral Libraries of England. In addition to these, Mr. Botfield made various communications to the Society of Antiquaries, which have been duly noticed by the President of that body, Earl Stanhope.

William CUBITT.—William Cubitt, M.P., was one of the most marked of that class of good and earnest men who, owing their success in life to their own exertions, rise to posts of distinction. He began life as a seaman; but in due time, following the bent of his genius, he studied architecture, and became a most successful builder. In truth, William Cubitt was the architect of his own fortune. He rose to the loftiest civic dignity of these kingdoms, attaining at the same time a seat in Parliament. Mr. Cubitt was so justly popular, and so much esteemed for his good sense, probity, and engaging manners, that he was twice chosen Lord Mayor of London, and died infinitely regretted by a large circle of friends and admirers.

John Watkins Brett.—Though not the scientific originator of submarine telegraphy—an honour which was won by Professor Wheatstone *—Mr. Brett was distinguished by being the first to show, by the actual experiment of laying a gutta-percha wire across the British Channel, in 1850, that the scheme was feasible. He had indeed called the attention of Government to the subject in 1845, with the view of connecting Britain with her colonies. He afterwards (1846-7) endeavoured in vain to carry out his project under the Government of Louis Philippe, though he had obtained a concession. At last, through his energy and ability, he obtained a renewal of the concession from Louis Napoleon; and in 1850 an experimental line was submerged by Mr. Brett between Dover and Cape Griznez, by which the *first* submarine message was sent from one country to another; 'The Times' of the day remarking, "the jest of yesterday has become the fact of to-day." The present cable between Dover and Calais was laid in 1851, and the Dover and Ostend line in 1853; the latter under a concession from the King of the Belgians. The next trial was in the unknown depths of the Mediterranean, under concessions from the French and Sardinian Governments, and resulted, in 1854, in uniting the Island of Sardinia with the Continent of Europe. It would be superfluous to trace further Mr. Brett's connexion with telegraphic enterprise: suffice it to say, that in 1856 he was mainly instrumental in forming the Atlantic Telegraph Company, of which he was one of the directors. It is rare to find a highly cultivated taste for the fine arts combined with an enterprising mind, yet such was eminently the case with Mr. Brett, as proved by his well-known, choice and varied collection of works of art. Mr. Brett died on the 3rd of December last, at the age of 58, bequeathing one-tenth of his large property to charity.

C. G. Puller.—C. G. Puller, Esq., a respected friend of my own, was one of the representatives of Hertfordshire. He was a conscientious, enlightened, and zealous Member of Parliament. He died most unexpectedly, after a very short illness.

Arthur Paget.—Mr. Arthur Paget, the heir of a great estate, was

* From the year 1840 onwards Professor Wheatstone familiarized the public with the feasibility of Submarine Telegraphy. I have before me documents which leave no doubt on this subject, and a jury of the International Association at Paris in 1855 unhesitatingly assigned this scientific honour to Wheatstone.

too early cut off: in the spirit of adventure and from love of geographical pursuits, he had visited America, the Pacific Islands, Continental India, Java, with others of the Malayan Islands, and Northern Africa. In China, during our last operations against the Imperial Government, he served as a volunteer, sharing in the perils and privations of his military companions.

The other deceased Fellows, who have not taken a prominent part in our proceedings, or have been noted as authors or public characters, are — Mr. Henry Ancell; Mr. Thomas Blackwell, an able Civil Engineer; Mr. David Barclay, Mr. William Jackson, Mr. George Lee, Mr. Thomas Molson, the Rev. W. Oxenham, Mr. Thomas Parr, the Rev. G. C. Rowden, Mr. John N. Ryder, Mr. W. Richardson, and Dr. Tronson.*

British Geography.

Admiralty Surveys.†—The Admiralty Surveys at home and abroad have made adequate progress during the past year, although, owing to the completion of some Coasts, and the retirement of officers, certain reductions have taken place.

English Coast.—Staff-Commander Calver, in the *Porcupine*, has re-surveyed the estuary of the Thames, a work which, owing to the shifting nature of the sands, was much required. He has sounded over an area of 240 square miles, and will, during the present year, continue to trace the changes to the north-east, along the coasts of Suffolk and Norfolk, till they disappear. The ever-changing character of the sands off these shores, and especially in the vicinity of Yarmouth and Lowestoft, calls for continued activity on the part of our Surveyors; and under the skilful and energetic superintendence of the officer charged with this service it is hoped that all the requirements of navigation, vast as they are, will be fully provided for. Captain George Williams, in the *Bann*, has completely re-surveyed and elaborately sounded the Scilly Islands, within a radius of 10 miles: his soundings cover an area of 550 square miles. During the present season he will be employed in completing the deep-sea soundings on the south coast of England, between the Eddystone and Portland. Commander George M. Alldridge, in the *Asp*, has

---

* I have learnt, too late for notice, that General Monteith is dead. The labours of this experienced geographer must be recorded next year.

† As prepared by the Hydrographer, Capt. Richards, R.N.

surveyed Caermarthen Bay, with the rivers Taff and Towey; thus completing the north shore of the Bristol Channel. This officer, after a long, active service, extending over thirty years, has retired with his promotion, and has been succeeded by Commander David Aird, who during the present season will continue the sounding of the southern shore of the Channel, between Minehead and Hartland Point.

The Survey of the Western Hebrides, under Captain Otter, is satisfactorily completed; and no delay will take place in the publication of this important part of the Scottish seaboard, on a scale commensurate with all the requirements of the seaman. There remains now to complete the entire western coast of Scotland but a small portion of the Island of Tyree, Skerryvore, and its off-lying dangers, with the deep-sea soundings in the same neighbourhood, which, under the direction of Captain J. E. Bedford and Mr. Stanton, will no doubt be brought to a close by the end of this year.

Captain Bedford and his Assistants, during the past season, have surveyed 142 miles of the exposed coasts of Coll and Tyree; and sounded over an area of 137 square miles, besides other details.

Commander Thomas has completed the shores of Benbecula and Harris, and retires with promotion after a long and unbroken period of active service of over thirty years.

The Survey of the Channel Islands, under Staff-Commander John Richards, has made good progress during the past season, and is being continued with that care and minuteness which a coast-line beset with so many hidden dangers necessarily requires.

Mediterranean.—The Surveys in this sea and the Grecian Archipelago, under Captain Spratt, C.B.,* and Commander Mansell, have steadily progressed during the past year. The examination of the different banks in the Malta Channel, the Survey of Tripoli, and the Island and Channel of Corfu, are among the most important works which have been completed. It will be learned with regret by all geographers that Captain Spratt, who has passed the greater part of his professional life in the active duties of the Mediterranean Survey, and for the last twelve years most ably conducted it, has resigned his important command. The records of this Society have year by year feebly recorded the benefits which have been conferred

* No stronger proof of the high estimation in which Capt. Spratt is held by men of science and art can be given, than that he was last year selected as the first out of many candidates in the list of the nine persons who are annually admitted into the Athenæum Club as "*eminently distinguished* in science, letters, and the arts, or public service."

on science and navigation by the energetic labours of this talented officer; but his works themselves will remain an enduring monument of his skill and industry for ages yet to come.

Commander Mansell, the late coadjutor of Captain Spratt, has taken his place; while Lieutenant-Commander Wilkinson has succeeded to that of Commander Mansell.

Newfoundland.—Captain Orlebar, with his Assistants, has surveyed 114 miles of the eastern coast of Newfoundland, between Cape Race and Cape Spear, including plans of several bays and harbours, and has sounded over an area of 1330 square miles: his work is in process of engraving.

Nova Scotia.—The examination of this coast, under Captain Shortland, is rapidly drawing to a close. During the past season 125 miles of sea and harbour shores have been completed, and 177 square miles sounded over.

West Indies.—The West India Survey, under Mr. Parsons, includes during the last year portions of the Islands of St. Vincent, Antigua, and St. Lucia. Mr. Parsons has now commenced the examination of Grenada.

Bermuda.—In consequence of the increased draught of our modern ships, and in order to ascertain whether any alteration has taken place in the depth, consequent on the growth of the coral, it has been considered necessary to make a re-examination of some of the narrow and intricate channels leading to this important depôt; and Captain Pullen is now employed on this duty.

Vancouver Island.—It was announced in our last Annual Report that the Survey of this important island, with the adjacent coast of British Columbia, had been completed. The *Hecate*, lately engaged on this duty, has arrived in England, and the work has been deposited at the Admiralty, by whom it will be published for the benefit of navigation without delay. The fruits of this Survey are already apparent in the rapid development of the resources of this region as a coal and timber producing country, and also of its fisheries. A company is incorporated for the establishment of a graving-dock in the harbour of Esquimalt, which will have the effect of drawing to the shores of this rising colony the ships of all nations from one end of the Pacific to the other. The Survey of the northern shores of British Columbia is being continued by Mr. Pender, late Chief-Assistant in the *Hecate*, who, with an able staff, has already made good progress with the work.

Australia.—Under the combined efforts of the four officers in charge of the different Surveys, considerable progress has been made in the delineation of the shores of this great country; the expenses being borne equally by the Colonies and the Home Government.

Commander Hutchisson, in South Australia, has completed the upper portion of Spencer Gulf, including 167 miles of coast, and has sounded over 964 square miles. He was, in his little vessel of 100 tons, to leave South Australia, and, passing round the eastern coast, by Torres Strait, take up the examination of the northern shore about Cambridge Gulf, that coast having lately been added to the territory of South Australia.

Commander Cox, in Victoria, has completed the Survey of Port Phillip and its approaches, but has been considerably retarded in his little vessel, of 65 tons, by the furious gales with which this part of Australia was visited during November and December, 1863. On the coast of New South Wales, the Survey under Commander Sidney is proceeding as rapidly as the means at his disposal will allow; but in consequence of the wreck of H.M.S. *Orpheus* at the entrance of Manukau Harbour, in New Zealand, he was directed to proceed to that colony and make a re-survey of the dangerous bar of that harbour. This duty Commander Sidney has effected, and returned to his survey in Australia. The new Survey of the Manukau Bar is in course of publication.

Mr. Jeffery, in Queensland, has surveyed part of Hervey Bay and the entrance of Mary River; and, now that he has been provided with a suitable vessel, no doubt the examination of the seacoast of this thriving colony will advance rapidly. But by far the most important event which has occurred in the annals of Queensland is the establishment of the new settlement at Cape York, in Torres Strait. The Government have lately dispatched a small detachment of Royal Marines to commence this work; and H.M.S. *Salamander* has been also sent from England to aid in the enterprise.

Under these favourable circumstances, coupled with the daily increasing prosperity of Brisbane, and the rapid extension of the white population towards the north, we cannot doubt but that the whole eastern coast of Australia will ere long be opened up to navigation and commerce. In truth, we are now beginning to reap the fruits of those long years of toil and industry—the rewards of that skill, patience, and perseverance which produced to the world the magnificent survey of 800 miles of channels within the reefs of this coast; a survey which, when commenced, must have appeared

i 2

almost a hopeless undertaking, but which has led to the opening of a safe highway, soon to become the beaten track between India and Australia. In connection therewith, let not the names of King and Blackwood, and Owen Stanley, be forgotten: well may the companions of these gifted men, who still remain, feel proud to have participated in a work which will ever remain a monument of their perseverance and their skill, and among Nautical Surveys will stand unrivalled.

China and Japan.—The opening of new ports and the rapid extension of the world's commerce with these countries have taxed to the full the energies of our Surveyors during the past year.

The *Rifleman*, under Mr. Reed, has been employed in defining the limits of the great central reefs which encumber the China Sea, and in clearing the two highways from Singapore to the north, viz. the N.E. and Palawan routes. This is a most important work, not only involving much time, but the greatest care and vigilance: real dangers have been correctly placed, and many imaginary ones, hitherto a source of constant anxiety to the seaman, have been expunged from our charts. Still much remains to be done in both these great thoroughfares before they can be pronounced free from danger. It is with regret we learn that Mr. Reed has been compelled through ill health to resign the command of this portion of the China Survey, which he has conducted with so much energy and ability. He has been superseded by Commander Ward, the officer who formerly commanded the *Actæon*, engaged on a similar duty.

The *Swallow*, under Mr. Wilds, has been employed in the northern portion of the Chinese waters. Its commander has made new chronometric measurements between Hong Kong, Shanghai, Nagasaki, Yokuhama, and the Korea, and surveyed 700 miles of coast-line, including part of the Korean Archipelago; Chin Chu Bay, on the south coast of Shan-tung; also the harbour of Amoy, a good plan of which was much required.

The re-survey of the estuary of the Yangtsze Kiang is now in course of progress, great alterations having taken place in its shoals since the Survey of Captain Collinson in 1842.

During the year 1863 twenty new Charts have been published by the Hydrographic Office of the Admiralty, besides numerous additions and corrections to others. The number of Charts printed during the same time has amounted to 150,517. Tide Tables have likewise been prepared by Staff-Commander Burdwood for 3000 places. Sailing Directions have been prepared by various officers: for the South and East Coasts of Africa, by Captain de Horsey, R.N.; for the Persian Gulf, by Captain Constable and Lieutenant Stiffe, of the late Indian Navy; and for the Gulf of Aden and East Coast of Arabia, by Commander Ward, late Indian Navy. A fourth edition of the 'China Pilot' has also been issued. This work has been thoroughly revised, and much additional information introduced from our late Surveys of the Coasts of the Yellow Sea, the Gulfs of Pe-chili and Lian-tung, the Sea and Islands of Japan, by Staff-Commander King. The 'South American Pilot,' Part 1, is just complete, and contains directions for the Eastern Coast of America, from Cape St. Roque to French Guayana, by Staff-Commander Penn.

Various other books of Sailing Directions are being revised or brought out anew, with all the dispatch which the means at the disposal of the department will permit, and the interests of navigation so urgently call for. Lighthouse Lists for every coast have also been published under the direction of Commander Dunsterville, R.N.; together with Hydrographic Notices of newly-discovered Rocks, Shoals, &c., with other information useful to navigation in general.

ORDNANCE SURVEY OF THE UNITED KINGDOM.*—The Plans of the six Northern Counties of England having been drawn on the large scales of 25 and 6 inches to the mile, have been reduced to and engraved on the scale of 1 inch to a mile; and although the engraving of the hill features upon a few sheets is not yet finished, the Map of England and Wales, for all practical purposes, may be said to be finished and published. The 1-inch map of Ireland, in outline, reduced from the 6-inch plans, has also been engraved and published; together with many of the sheets with the hill features represented.

In Scotland the survey of Buteshire, Forfarshire, and Kincardineshire, on the large scale, was finished during the last year, and considerable portions of Aberdeenshire and Argyleshire have also been surveyed. All the southern portion of Scotland, including Perthshire and Forfarshire, has been engraved and published on the 1-inch scale. The principal cultivated district of Scotland remaining to be surveyed extends from Peterhead to Inverness; and for the purpose of expediting the work in this quarter, officers are stationed

* Prepared by Colonel Sir H. James, R.E.

at Aberdeen and Inverness, and another will shortly be sent to Banff. The importance of proceeding also as rapidly as possible with the survey of the Highlands, is now fully recognised; and rooms have been prepared at Fort Augustus to receive another officers' party.

The publication of the Reports of the Royal Commission, and of several Select Committees of the House of Commons, has had the effect of fully enlightening the public as to the importance of having a complete cadastral or large survey of the United Kingdom. Last year Her Majesty's Government gave directions for the whole of England and Wales, south of Yorkshire and Lancashire, to be resurveyed, and the plans drawn on the scales of 25 and 6 inches to a mile, like those of Scotland; and the first vote for proceeding with this great work was passed by the House of Commons this year without opposition; but with an objection, on the part of some Members, to the insufficiency of the amount voted for prosecuting the survey with the rapidity which is desired.

The principal triangulation, and the initial levelling of the United Kingdom, have been published; and the Survey Department is therefore in a position to proceed with the detailed survey in any part of England and Wales. During the last year the survey of Middlesex was finished, with the exception of the detail-plans of the city of London, which has already been published in outline, and large portions of the counties of Surrey, Kent, Essex, Devonshire, Cornwall, and Hants have also been finished. The estimated cost of completing the Cadastral Survey of England and Wales is 1,400,000*l.*; but with a grant amounting only to 75,000*l.* for England, Ireland, and Scotland, or about 25,000*l.* for England and Wales, it is obvious that the means is very disproportioned to the magnitude and cost of the work.

The extension of the Triangulation of the United Kingdom into France and Belgium was published in 1862. This was undertaken for the purpose of connecting our triangulation with that of Europe, so that we now have a connected triangulation extending from the West of Ireland to the Ural Mountains, and the data for completing an arc of parallel in the latitude of 52° N., extending over about 72° of longitude. Operations are now in progress for determining the difference of longitude between selected stations along the course of the arc; and as, on account of the "personal equation" of every observer, it is necessary that the same individual should be employed at every station, the Russian officers, Colonel Forsch and

Captain Jilinski, of the Imperial Staff, who commenced their observations at the eastern extremity of the arc, are now working their way westward, and are expected to arrive in this country to observe at Greenwich, Milford, and Valentia in July next.

The publication of the facsimile of Domesday Book by the Photozincographic process was finished last year. The original MSS. are contained in two volumes, designated 'Great Domesday Book' and 'Little Domesday Book,' containing 760 and 900 pages respectively. The facsimile has, with one or two exceptions, been published by counties, in 32 volumes, and 10,280 volumes have already been printed. This copy of the Great Survey of the Conqueror has been received with great satisfaction by the public; and the production of a series of County Maps, showing the position of the several manors or properties mentioned in it, is now contemplated.

Geological Survey of the United Kingdom.—Besides an enumeration of the new geological maps which have been published in the last year, of the Southern and Central Counties of England, and large portions of Ireland and the South of Scotland, I have explained in my Report to Parliament, that in the coming years a sufficient number of surveyors will at once be employed in working out the structure of the North of England. Whilst it is an obvious duty of the Geological Survey to develope the great mineral resources which exist in the northernmost English counties, the public must recollect that the Ordnance Maps of that region, on which alone our work can be carried out, have only recently been brought towards completion. Until this was effected, I deemed it to be highly desirable to finish off the geology of the districts around the metropolis, particularly with a view to the greater supply of water for a vast population from subterranean sources. Now, however, that these southern districts have been geologically surveyed, no time will be lost in applying vigorously to the North the same processes as those by which the structure of Wales and the southern and central counties of England has been eliminated. In a few years, therefore, I hope to see maps and sections published which will fully illustrate the older rocks of the lake regions of Cumberland and Westmorland, as well as of the rich coal-fields of Yorkshire, Durham, and Northumberland.

New Publications.—In respect to the publication of works on geographical subjects within the last two years, I cannot pretend to have a due acquaintance with many of them. The most remarkable maps which have come into our possession have been mentioned in the Report of the Council; and a certain number of those which have been published abroad will be further alluded to in what I have to say on various foreign countries. In addition to these, some of the maps and original articles in Petermann's 'Mittheilungen' may be passed in review in this place. I would more especially mention the articles by the accomplished editor, on the physical and statistical survey of the Austrian Empire, illustrated by nine coloured maps: Sartorius von Waltershausen's survey of Etna, with a topographical map printed on the same sheet with a map of Kilima-ndjaro, as surveyed by Baron C. von der Decken; the two being given on the same scale to facilitate comparison between the two mountains; the articles by Petermann on the sea-bottom of the British seas and the cartography of the Mediterranean, as delineated in the excellent maps of these regions in Stieler's Atlas; and, lastly, the maps in illustration of the geographical and other results of the Swedish expedition to Spitzbergen. With regard to British publications, there remain a few which seem to me to deserve a passing commendation in this Address.

The Index Geographicus of Keith Johnston; or an Alphabetical List of the principal places on the Globe, with the latitudes and longitudes, is a most useful addition to every good library.*

Phillip's New Imperial Library Atlas, edited by Messrs. Bartholomew and Hughes, Fellows of our Society, is a clearly-defined and attractive work. The chromo-lithographic colouring of the maps is effective, and the divisions are not obscured by the insertion of too many names. The accompanying Index Geographicus at once enables the reader to find any place on the map.

A work about to appear has just been put into my hands, entitled 'A System of Universal Geography,' by Dr. Muir of Glasgow, one of our youngest and most industrious Associates. It forms a large volume, and conveys in a compendious style some of the latest information on the various countries of the earth. From its plan of arrangement the work appears to combine the advantages of a gazetteer and those of a text-book for schools and families.

Mr. Murray has just published two volumes of the Travels of M. Mouhot, by his widow, a descendant of Mungo Park. The travels are in Siam, Lao, and Cambodia, and have near 100 beautiful illustrations: they describe the most remarkable ruins of temples and palaces which have ever been discovered, comparable only for

* Blackwood and Sons.

magnitude to the Pyramids and temples of Egypt. The book is dedicated to the Royal Geographical Society.

Mr. William Simpson, one of our Fellows, who has spent much time in delineating the natural features of Upper India, the Himalayas, Tibet, and Cashmere, has brought home a series of coloured paintings of great beauty, which, I hear, are about to be published. The sources of the Ganges and the Jumna, the fine scenery of Rajpootana, and the Falls of Gairaoppa, in Mysore, are as strikingly represented as numberless buildings are elaborately and artistically worked out.

Among the elementary publications, I may direct attention to an useful little work, by the Rev. Alexander Mackay, entitled 'Elements of Modern Geography.'* In a former Address I ventured to commend the 'Manual of Geography,' by the same author; and the present production is an improved and careful epitome of that work, which can be recommended as a text book to be used in the educational establishments of the country. Considering that the author is—as I know myself—actively employed as a minister of religion in the heart of Aberdeenshire, remote from access to libraries and the great marts of knowledge, I cannot but admire the assiduity and research displayed in the preparation of this elementary treatise.

Foreign Cartography.—On the detailed progress of Cartography in foreign countries I must delay the attempt to give a *précis*, except with respect to Russia; and on the great strides made by the geographers of that empire I will presently dilate. It is, however, my duty to notice, that though engaged in a gallant and strenuous defence of their country, the Government of the ancient kingdom of Denmark did not omit to comply with our request, to transmit to our Society all the sheets of their Topographical Survey up to the time of their presentation.

Of these maps, which when completed will number seventy sheets, about one-fourth are already finished and in our possession, and I can truly say that I never saw more beautiful specimens of cartography. They embrace many details, more, indeed, than those of our own Ordnance Survey on the small scale, and are usefully combined with hydrographical charts on the same scale, exhibiting the soundings and sand-banks; an agreeable effect being produced by slightly tinting the water. Even on the scale of $\frac{1}{80000}$, or one inch to a mile

---

* Blackwood and Sons.

and a quarter, all the elevations are delineated by contour lines, their height in feet being given. Not only are the houses and farmsteads marked, but also the minor enclosures and wooded and marshy tracts; so that this map may be favourably compared with any work published by other and larger nations. Several excellent geological maps accompany this valuable donation to our Map Office.

It also gratifies me to place on record a kind act of the Government of Copenhagen in acceding to a request I recently made through his Excellency the Danish Minister, M. Bille, when the Elbe was blockaded, to grant a passport to the ship in which the river steamer of our Medallist, the Hanoverian Baron C. von der Decken, is to be translated from Hamburgh to the East Coast of Africa. The passport was at once sent, for happily scientific explorations were considered as sacred by the Danes as they were by the French when the Austrian frigate *Novara* was circumnavigating the globe during the Crimean war.

We have to thank the Prussian Government for transmitting to us the detailed map of the course of the Weser, from its sources to its mouth. This map is on twenty-one sheets, on the scale of $\frac{1}{200000}$, or three miles to an inch.

Lastly, from Switzerland our excellent correspondent, M. Ziegler, has transmitted for the Society a copy of the maps recently published by the Federal Post-office department; representing the railways, postal routes, and telegraph stations of the Confederation. The maps are accompanied by a table of distances between the towns, and are remarkably clear and well executed. The important question of the determination of heights in Switzerland has much occupied the attention of Swiss geographers, and a committee has been appointed by the Federal Government to reconsider the subject, in consequence of the levelling of railroad lines having shown a difference of 2 to 3 mètres from the determination as given in the official maps of General Dufour.

Recent Progress of Geography in Russia.—Judging from the grandeur and importance of its operations, the Geographical Society of St. Petersburg may well be styled "Imperial." He who will peruse the Compte-rendu of the proceedings of that body, as ably perpared by the Secretary, M. Besobrasoff,* cannot fail to admire the wide and laborious surveys which have been effected, the number of valuable maps which have been prepared, and the various sciences

* Translated into French from the Russian.

affiliated to geography which have been enriched by researches amid regions hitherto for the most part unexplored by any traveller, and most imperfectly known to geographers. Founded on the model of our own Society so recently as the year 1846, the Imperial Society of St. Petersburg has now, indeed, become a most important body under the presidency of the Grand Duke Constantine, assisted by that enlightened nautical surveyor and circumnavigator Admiral Lütke.*

Whilst the practice in England, and our habits, have led us to separate ethnology and statistics from geography,—the parent Royal Society, the Linnæan and Zoological Societies, and the younger body the Ethnographical Society, gathering papers on the various subjects closely allied to geography,—the Geographical Society of St. Petersburg embraces all these cognate branches, and combines them with physical geography and travels; separate sections for each subject being organized with separate presidents, irrespective of the officers and council of the general body.

As I had the honour, when this Imperial Society was founded, of being named, in association with Humboldt and Ritter, one of the three first elected Foreign Honorary Members, simply because I had assisted in working out the structure of portions of that vast empire, I naturally take sincere pleasure in pointing out to my Associates the successful strides which this body has made, and particularly in the last few years, in extending our acquaintance with large portions of Northern Asia, as well as in the construction of accurate maps, and the diffusion of sound knowledge in statistics, natural history, and ethnology.

Independently of the justly famous measurement of an arc of the meridian from the North Cape to the Black Sea, carried out by the astronomers and surveyors led by Struve and Tenner, on which I have dilated on previous occasions, the geographical explorations of Eastern Siberia and the borders of the Chinese Empire have been so conducted as to throw quite a new light on the physical geography and natural history of those vast regions. These surveys were organized in so judicious a manner that they were almost certain to produce good fruits. Thus, while to M. Schwartz, of Dorpat, and his assistants, was entrusted the preparation of the topographical maps, to MM. Schmidt and Glehn were allotted all geological and mineralogical inquiries; whilst M. Radde, assisted

* Admiral Lütke has recently been advanced to the dignity of President of the Imperial Academy of Sciences.

by other able men, was responsible for the zoological and botanical departments.

With such sound pre-arrangements we need not therefore be surprised, that these explorers should have made observations which call for great changes in all pre-existing maps, and at the same time greatly enriched the domain of natural history. Among the most important of the new features which characterize these researches, and which are perspicuously pointed out by M. Besobrasoff, the following may be mentioned. The physical section of the East Siberian expedition has ascertained that many of the existing notions of the configuration of the vast basin watered by the great river Amur and its affluents are not only very inexact, but are often diametrically opposed to the truth. The connection, for example, of the lofty mountains proceeding from the eastern side of the lake Baikal, and called Yablonoy, with those termed Stanovoy on the north-east, has no existence. On the contrary, it has been ascertained that in this region, as in the interior of other continents (a phenomenon to which Humboldt first directed attention), the true parting of the waters often proceeds from comparatively low plateaux situated among much loftier mountains, through which the rivers escape in deep chasms. In this way the watershed of Eastern Siberia is found to proceed from the north of the lake Baikal, a little to the north of 56° N. lat., and to throw off the affluents of the Lena to the north, and those of the Amur to the south. We also learn that in a more eastern or lower portion of the great Amur, the chain of Bureia has a different outline from that which has been assigned to it. The sudden southward deflection of the mighty Amur from the Cossack station of Pashkoff is determined by a lofty mountain-ridge striking from east to west, and not from north to south, as formerly represented on maps. This stream has, in fact, found an issue by a profound fissure, with precipitous cliffs on either side, of which gorge it takes advantage. If we turn to the western portion of this region of Siberia, we find that there also researches have produced a great change in our previous knowledge. The form of the Saians Mountains, which range eastward from the Altai, has undergone considerable modification, as determined by the observations of Schwartz and Kryjine.

Practical cartographers will consult with much profit the maps, almost completed, of these hitherto ill-defined tracts, and geologists are awaiting the description of the rocks and their contents, whilst ethnologists are looking for accounts of those curious tribes of

Mongolian and Russo-Chinese Tartars, of which the late Mr. Atkinson and his relict have given us such lively sketches. In the mean time we may be quite sure that the splendid and abundant collections of animals and plants brought to St. Petersburg will be found to illustrate the direct dependence of the animal and vegetable products on the physical geography and climatology of the region. It is by such a well-devised and richly-endowed expedition as that of the Survey of Eastern Siberia that geography attains its highest distinctions; and I am sure that all those whom I address will rejoice with me, that a Society founded on our model should in so few years have attained a distinction which entitles it to the grateful thanks and approval of all geographers.

Whilst the Russian Geographical Society has thus carried scientific explorations, and applied its science to newly-acquired, wild tracts in Northern Asia, and to important outlets for the commerce of the empire, its members have not been less actively employed in enriching their country with valuable data, in cartography, ethnology, and statistics.

When I travelled in Russia, upwards of twenty years ago, the greatest of all desiderata, and which, as a geological explorer, I felt most, was the want of a good general map of the country. That work, which was commenced by the Imperial Geographical Society in 1857, has been completed, and the map was issued for sale last year. This most important work, embracing the Caucasus, has been followed by another still more scientific,—a Geographical and Statistical Dictionary of the Empire, of which some parts have already been published. Thanks to the very numerous journeys and surveys which have been made, this Dictionary will be a striking record of the substantial advances which Russia has achieved in the last quarter of a century.

In an Address like this, in which it is my duty to refer to geographical progress in many countries, I cannot do justice to the Imperial Society as regards numerous other subjects which this body has, in the most exemplary manner, combined with the extension of the higher branches of physical science. Inquiries of real utility to the nation, such as in times gone by were executed in England by the Society for the Diffusion of Useful Knowledge, have been made in various branches of statistics, showing how zealously the Russian Government is labouring to dispel ignorance, and thus, by extending true knowledge, to enable all classes the better to appreciate and value the vast improvement, amounting to a social and peaceful revolution in the condition of the people, which the present Emperor has so liberally and beneficially introduced. Some of these good measures were, indeed, on the point of being carried out in the western Governments bordering on the kingdom of Poland, when the outburst of the insurrection in the latter seriously interfered with the development of the material prosperity and improvement of the country.

In reference to the establishment of telegraphic communication with China across Siberia, in which, as I announced to you last year, our associate Mr. Grant was busily employed, it is satisfactory to know that the Russian portion of the enterprise is so far completed, that the telegraph station at Irkutsk, distant 5700 miles from St. Petersburg, was opened five months ago (2nd December, 1863), and thus messages will be, as it were, instantaneously conveyed, which formerly required 23 days. To no country, indeed, is telegraphic communication of more vital consequence than to Russia, in which a Government messenger, carrying the most important despatch, would have occupied a month in conveying that which is now the affair of hours, if not of minutes.*

Further results of the expedition of Eastern Siberia and the borders of China, including all the river-system of the Amur, have recently appeared in the publication of a large map in 7 sheets, on the scale of 40 versts to an inch. This work, executed by M. Schwartz, is accompanied by a general detailed *aperçu*. The same author has also prepared a cheaper map on a smaller scale and embracing a much larger region of Siberia. M. Schebunin has executed a detailed map, on the scale of 5 versts to an inch, of Sakhalin, which shows great changes in the form which has been given to this large island in all preceding maps; he also contemplates de-

* In the lately-acquired territory of Eastern Siberia a new colony has been founded, to the south of the Amur, on the Usuri River which waters the richest country of that region.

The general reader as well as the geographer will be highly gratified by a perusal of the work of Le Comte Henri Russell-Killough, entitled 'Seize mille Lieues à travers l'Asie et l'Océanie' (Paris, Libraire Hachette, 1864), which the author has transmitted to me since the Anniversary. The author's journey across Siberia and the Desert of Gobi, in the depth of winter, is in fine contrast to his descent in the summer of the great river Amur to its mouth, amid the most luxuriant and magnificent vegetation. I cite this work, when speaking of the geographical researches of the Russians, as giving so attractive a description of the scenery as to render many a traveller anxious to visit that magnificent gigantic stream, the Amur, during those months when it is open to navigation. In short, whether as respects Eastern Siberia, China, Japan, our Australian Colonies, or our Indian Empire, I gladly commend the work of Comte Henri Russell as a graphic sketch by a quick observer and a lively and agreeable writer.

tailed maps of other tracts, including the course of the rivers Amgun and Bureia.

From the researches of M. Schmidt the geologist, aided by the botanist Glehn and the topographer Schebunin, we learn that the region beyond the Sea of Baikal is distinguished by a great variety of geological formations. Crystalline rocks, however, abound, and the unaltered sedimentary fossiliferous formations are much less extended. Among the latter, the Devonian and Jurassic deposits have been best recognised. The latter has the petrographical characters of the Jurassic rocks of the Caucasus, and contains certain beds of coal, which in one spot is said to pass into graphite. Further eastward, and along the Saigon or chief mountains, and on the Amur below the junction of the Zeia, there are spread out great fresh-water formations of tertiary age, whilst in the great island of Sakhalin very recent marine tertiaries repose on true chalk and cretaceous deposits. Having discovered what he believes to be many transitions between crystalline rocks and unaltered sediments with fossils, M. Schmidt is of opinion that all such changes have been brought about in an aqueous manner, and not by any plutonic or igneous action. The ingenious author is obliged, however, to admit the existence of obsidian in one place, and has not yet developed his proofs in favour of his novel system, in which, if I have not been misinformed, he seems to carry the chemical and Neptunic ideas of Bischoff to what I cannot but consider an extravagant length.

From such theoretic speculations it is indeed comforting to myself, as a practical geologist, to turn to the more recent labours of my distinguished friend M. Abich in the peninsula Apcheron and the adjacent parts of the Caspian Sea. There, the apparition of new islands in the sea, and the eruption of the mud volcanoes on land, show, according to him, the close connection which exists, in a natural history point of view, between the ancient igneous phenomena so apparent throughout the Caucasus and the analogous but much more puny eruptions of the present day, as exhibited in the north-eastern flank of that great chain, where one of the islands (Kouman) was thrown up in 1861.

After five years of active labour and assiduous researches in Eastern Siberia and in regions rarely visited before, and some where no naturalist had preceded him, M. Radde has, as it were, completed our acquaintance with the zoology of these vast regions, parts of which only had been visited by Pallas, Middendorff, and Voznessensky, and recently by Maack and Schrenk. The last of these travellers gave indeed an excellent idea of the natural history of the region of the Amur; but M. Radde has done more, in gathering together a complete fauna of Eastern Siberia. He has prepared zoo-geographical maps of all the regions he traversed, in which he has shown, by means of colours, the limits of the range of each group of animals. His comprehensive geographical researches, which led him to divide Northern Asia into three zoological and botanical zones, are of a high order of merit. These regions are Siberia proper, to the southern limit of which the reindeer ranges, and in which the Siberian cedar grows; the region of the Mongolian Steppe; and the region of Northern Manchuria.

Confirmed as these grand zoological deductions are by the determination of the collateral plants of each, I am led to believe that, since the earlier days of Humboldt, there is no work on natural history which has more tended to complete the general views of the true physical geographer. This grand publication of M. Radde has directly resulted from the direction of the Imperial Geographical Society and the support of the Government; and we hope soon to be able to admire the illustrations of numerous natural types hitherto wholly unknown to men of science.

Another contribution to the physical knowledge of these countries is a pamphlet on the climate, by my valued friend M. Middendorff, the justly-celebrated traveller in Northern Siberia. The work entitled 'La Contrée de l'Amour,' by M. Maximowicz, is also a most important addition to the literature of the Geography and Natural History of Siberia.

Irrespective of natural history as a branch of geography, one phenomenon has been brought out in strong relief by the physical section of the expedition to Eastern Siberia, viz., that in the basin of the Amur, as in the island of Sakhalin, the right bank of the river is steep and precipitous, and the left bank low and flat. I pointed out the same phenomenon twenty years ago in regard to the great rivers Volga, Oka, &c., in European Russia.* The probable explanation of this striking phenomenon is that the flat regions on the left bank of each river were formerly broad riverine sheets, and by the elevation of land, the destruction of forests, and other causes, have been so desiccated that the waters have at length found their natural boundary in the escarpment of rocks which rise successively from the low regions of the north to the loftier ranges of the south.

* See 'Russia in Europe and the Ural Mountains,' vol. i. pp. 21, 650.

An expedition under M. Anosoff in search of a gold region on the Chinese frontier, reported as such by fugitives, has returned without success. They found that this tract had been extensively washed for gold, and, from the remains of buildings, &c., it is supposed this district of country had been occupied by a powerful people, but the gold seems to have been nearly exhausted.

In further developing the geography of the Kirghis countries between the Russian and Chinese boundaries, the Imperial Geographical Society have been so fortunate as to secure the services of M. C. Struve, who, assisted by M. Potamine, an accomplished Cossack, has been for some time exploring the water system of the Black Irtysh, and who, when last heard of, had passed the mountains, containing graphite, which separate the basins of Baikal and Tszai-San. The great lake of Tszai-San with its fisheries had already been occupied by Russia; it receives no streams from the north; the basin of the Black Irtysh is entirely distinct from that of the Ulangur. The explorers found the mountains of the South Altai to be much nearer to the Lake Marka than is represented on maps; this highly picturesque sheet of water being embosomed in lofty mountains. In these Asiatic explorations the Transilian, or country of the seven rivers (Semivetchurt), must not be forgotten as having been examined by Colonel Golubeff and Colonel Babkoff at the east end of the Lake of Tszai-San.

Coal has been found in the mountains of Karatau by Colonel Tcherniaieff, which, though of poor quality, may prove of importance to Russia in feeding her new flotilla on the Sea of Aral, with fuel by transit along the great river Syr Darie. The present supply of coal for the Aral region comes from the coal-field of the Donetz in South Russia, a distance of about 1200 miles over the Caspian Sea and Desert of Ust Urt.

Among the important expeditions recently undertaken and directed by the Imperial Geographical Society is that which, under the guidance of the eminent naturalist M. Baer, aided by M. Radde, has examined the Sea of Azof. All the results of this inquiry are not yet fully known; but whilst we ascertain that the amount of sediment and detritus poured out by the Don and other streams into this inland sea necessarily diminishes the depth of its waters, yet, this operation not being so rapid as some persons have supposed, a long period will elapse before navigation will be materially impeded.

The conclusion of the Russian report had not reached me when this Address was read; but in the part transmitted I am glad to find that the eulogies which I passed, at the last Anniversary, on the labours of M. Khanykoff and the Russian Expedition in Persia quite accord with the well-digested analysis of M. Besobrasoff.

Arabia.—We have been much gratified within the last few months by the lively and exciting narrative of his journey across Arabia, given to us by Mr. Gifford Palgrave. This enterprising traveller, who took high honours at Oxford, and has since been a wanderer over many regions of Asia, travelled in the character of a physician across the northern and central parts of this great, but little known, peninsula; and, with the exception of Major Sadleir, who is described as having travelled with the silence of a bale of goods *in transitu*, he is the only one of modern explorers, who, crossing the very heart of the country, emerged on the Persian Gulf.

Although Mr. Palgrave has fixed no latitudes nor longitudes, he yet travelled far beyond the adventurous Wallin of Finland, who only reached Haîl. His sketch of the people of the inland kingdom of the Wahabites, and their capital Riadh, and the clear distinction he draws between the wandering Bedouins and the regularly governed, civilised, and strict Wahabite Mahomedans who live in the central towns, are so very instructive, that the Council have warmly approved his labours by conferring on him a testimonial. I trust that Mr. Palgrave will elaborate the eloquent communication he made to us, and which is given *verbatim* in Vol. viii. p. 67, of our Proceedings, by producing a work worthy of his abilities and research. I can truly say that on no occasion have I seen the Fellows of the Geographical Society more gratified and excited, than when Mr. Palgrave narrated his adventures in crossing Arabia; and surely, as respected the deep interest created, I was fully borne out when I termed his narrative the Thousand and Second Arabian Night's Tale!

Little as we know of the interior of Southern Arabia, I am reminded by my friend the Rev. C. Forster, that there are evidences tending to sustain the accuracy of Ptolemy, when he speaks of four rivers in that region. In the parts of Arabia traversed by Mr. Palgrave, a river, after fertilising whole valleys, disappears under the sands, and re-appears no more. So is it in the south. For, even on that very coast, so well surveyed by the ship *Palinurus*, and where no rivers were discovered, a river, the mouth of which is lost under sands, was discovered by the late Rev. Thomas Broockman, who examined that coast in an Arab *dhow*, proceeding from Aden to Shehr, and landing continually in spots where no large ship (like the *Palinurus*) could approach. This river is considered by Mr. Forster to be the Caûa Canim of Ptolemy; and a lithographic sketch of it is given in his 'Sinai Photographed,' and is described at pp. 349, 352 of that work. Mr. Forster further believes, from the accounts given to Mr. Broockman, that another of Ptolemy's four rivers, the Prion, runs parallel to the coast-ridge, and is lost in interior sands. Not pretending to give any opinion upon the question of whether these rivers be really two of those mentioned by Ptolemy, it is gratifying to find that, as in Africa, so in Arabia, modern discoveries go to sustain the accuracy of that great ancient geographer.

Hindostan.—The Report of the operations of the Trigonometrical Survey of India during 1862-63, is full of interesting professional details. This great Survey, which was commenced upwards of fifty years ago, and which has since been so ably conducted by our distinguished Associates, Sir George Everest and Sir Andrew Waugh, is one of the most important results of our rule in India; and the present Report by Major J. T. Walker, R.E., as one of a series containing the history of the Survey, is of great value. In addition to the general review of the proceedings for the year, it contains two Reports, which are complete in themselves and of special interest, namely, an account by Mr. C. Lane of a portion of Independent Tipperah, and a reconnaissance, by Captain J. P. Basevi, R.E., F.R.G.S., of a portion of Jyepore, in Gondwana. These are parts of India hitherto unknown, and which have never before been visited or mapped.

The important observations of Captain Godwin-Austen on the region of the Western Himalayas will be commented on under the head of Glaciers (p. 221).

Major Showers, of the Indian Army, has recently published some interesting letters upon two practical questions connected with the geography of India: the one refers to the terminus of the Madras Railway on the Malabar coast—the other to the proposed port at Sedashegur. Major Showers gives good reason for preferring Narakal—6 miles north of Corhin, as the ocean terminus of the railway—to Beypoor, which is 80 miles farther to the northward, the latter being an open roadstead exposed to the full force of the south west monsoon; whilst at the former place, the sea within the area of a square league, forming the anchorage, is in all weathers perfectly calm. If the account which Major Showers gives of this locality be correct—and he appears to write from personal observation as well as on the authority of the resident Marine Officers—the calmness of the sea along the Narakal shore is one of the most remarkable phenomena of physical geography in the world, and well merits further investigation. With respect to Sedashegur, which is regarded with so much interest at present, as the proposed outlet for all the cotton-produce of the Southern Mahrattan country, Major Showers's opinion is decidedly unfavourable. He shows, in the first place, that the construction of a breakwater in the open sea, without which the port would be inaccessible during the monsoons, would be attended with the utmost difficulty, owing, on the one hand, to a sea-bottom of soft yielding mud, and, on the other, to the working season being limited to an interval of seven or eight months' duration; and he shows, in the second place, that if the port were formed, it would be almost impossible to maintain a regular communication with the interior, owing to the natural obstacles—especially from floods—as well as the extreme unhealthiness of the surrounding tract of country.

Formosa.—Mr. Swinhoe, who had well prepared himself for such a task by a long residence in China, has given us a very clear account of the geography, ethnology, and natural history of this island. The value of this communication from H.M. Vice-Consul at Formosa was pointed out at length to the Society by Admiral Collinson, who formerly surveyed its shores, and by Sir Harry Parkes, who gave to the meeting an instructive sketch of the history of European, Chinese, and Japanese relations with the islanders. The prospects of increased trade with this large and fertile island, now that it is opened under Lord Elgin's treaty to Europeans, were discussed, and the statements of Mr. Swinhoe confirmed regarding the superiority, as ports, of Tam-Suy and Ta-Kow to the port Taiwan, which was the one originally selected.*

The Malay Archipelago.—At the meeting of the 8th June, 1863, we were gratified by the reading of a Memoir from the pen of that eminent naturalist, Mr. A. R. Wallace, on the Malayan or Indo-Australian Archipelago.† After eight years, passed in that highly-interesting region of islands of all dimensions, from the vast and still little known Borneo, and the still less known New Guinea, to the remote and semi-barbarous Timor, Mr. Wallace came before us with a well-established natural boundary-line between one large

* See 'Proceedings Royal Geog. Soc.,' vol. viii. p. 23; also 'Proceedings of British Association for Advancement of Science,' Newcastle Meeting, 1863.
† See 'Proceedings,' vol. vii. p. 206.

region of the islands of the Archipelago and another; the one being Asiatic by its animal and vegetable life, the other having an Austro-Malayan type.

Indicating how the Asiatic Islands were probably once connected as *terra firma*, and pointing to the various oscillations of the surface, in these lands so replete with volcanoes, Mr. Wallace happily shows how, by simply traversing one gut or channel occupied by a deep sea, only 15 miles wide (between Bali and Lombok), the traveller is at once transported from the Asiatic to the Australian kingdom of natural history. This physical separation he considers to be one of great antiquity, whilst the separation of the mass of Asiatic lands to the west of it into innumerable smaller parts (yet all being a community of Asiatic type), is viewed as being of posterior date.

Whilst this philosophic Memoir naturally gave great satisfaction to my learned and sagacious friend, Mr. John Crawfurd,* who has passed many years in the Indian Archipelago, I must also be allowed to say that it gave equal satisfaction to myself, from the skilful manner in which the author brought to bear all his lore in the various branches of natural history, to sustain his grand geological inductions as to the enormous changes which have successively occurred in the physical geography of those diversified regions.

It is, indeed, to be remembered with pride (particularly by us, who cheered on Mr. Wallace when he left these shores ten years ago on his adventurous travels), that no such results as these could have been laid before geographers when the sciences of Zoology, Botany, and Geology were in their infancy. The work of Mr. Wallace is, therefore, a true index of the advance which has been made in geography, in the correlation of the most arduous and extensive researches and observations of the traveller and statist with every branch of natural history science.

Australasia.—The great and important discoveries made in hitherto unexplored tracts of Australia having been largely dwelt upon in last year's Address, I will confine myself now to mentioning several collateral subjects, which have recently been brought forward in respect to that vast portion of the terrestrial surface of the globe.

The intention, to which I alluded at the last Anniversary, of colonising portions of North Australia by South Australian settlers, to proceed thither by sea, is about to be carried into effect. A North

* See Mr. Crawfurd's most valuable work, 'A Descriptive Dictionary of the Indian Islands and adjacent Countries' (Bradbury and Evans, 1856), with a map of the Asiatic Archipelago.

Australian Settlement Company has, indeed, been formed, the chairman of which is Sir Richard Graves M'Donnell, the late Governor of South Australia, and under whose administration M'Douall Stuart made that remarkable journey from Adelaide to the Indian Ocean,* which has led his brother colonists to make this great venture. If success should attend the bold enterprise, whether brought about by a settlement in Van Diemen's Gulf, or in the Queen's Channel of Cambridge Gulf—the latter of which I should think much preferable (see my last Address)—then it is almost certain that a separate North Australian Colony must be established, inasmuch as it will be impossible that the Government of Adelaide should rule a population separated from them by a distance of 1300 miles, much of the intervening space consisting of tracts of almost impassable sands and forests.

If such a colony should be established, and it be afterwards found impracticable for Englishmen to labour in the open air in so warm a latitude, I trust that Hindoos, Malays, or Chinese may be used for that purpose; for, by whatever means effected, I shall rejoice in seeing the realisation of a project, which I have advocated at meetings of this Society for many years. I am fully persuaded that, with the rich products of that region, the fine bays of the sea on the south shore of the great Indian Ocean must, sooner or later, be occupied by a great maritime nation like our own, which already possesses the other three sides of this vast continent.

Already, indeed, we know that, under the auspices of the Governor of Queensland, Sir George Bowen, and for the purposes of trade and commerce, a new settlement has been made at Cape York, the northernmost point of this continent. From the same authority we learn the results of the important naval survey of the inside of the Great Barrier Reef, as completed by Commander Robinson. On this point I must refer you to the full explanatory comments of Sir Charles Nicholson and the Hydrographer, Captain Richards, as given in the report of the meeting on the 11th April last, which is to be seen in our Proceedings.

We now know, from the high authority of Captain Richards himself, that, although twenty years ago the inner route from Cape York to Moreton Bay was the most intricate passage in the world, it is

* Whilst these sheets are passing through the press I have received copies of the 'Journals of J. M'Douall Stuart,' which have just been published in a handsome volume, by Messrs. Saunders and Otley; edited by Mr. Hardman, and illustrated by Mr. Angas, with an excellent map by Weller. The work ought to be in the hands of all who are interested in Australian exploration.

now rendered as navigable as the English Channel, thanks to the labours of our naval surveyors. It was, indeed, most gratifying to find Captain Richards characterising that survey as one of the most gigantic and splendid undertakings ever carried out by any nation; and I repeat, what I have said before, that every true geographer will gratefully cherish the recollection of those bold and skilful seamen, Captain F. Price Blackwood, Captain Owen Stanley, and their successors, through whom the east coast of Australia has been opened out to the navigation of the world.

The mooted question of the extent to which the successful propagation of flocks of sheep can be carried in advancing towards the Equator from our old settlements in Australia, which was vigorously discussed last year, particularly when the journeys of Landsborough and M'Kinlay were under our notice, has been revived, and will no doubt continue under discussion until the perseverance of our countrymen shall have decidedly settled that limit by experience. As far as ascertained data go, it had been found that in Australia sheep have thriven up to 19° south latitude, which alone gives us an enormous range for the flocks of new settlers.

Amid the few regions of which we have acquired little or no additional knowledge in the last quarter of a century, we may certainly place New Guinea. Hence it gave me much pleasure when the attention of the Council was directed to a proposal of Sir Charles Nicholson to endeavour to explore the southern coasts, bays, and rivers of that great mass of land, from the new settlement of Cape York. I trust that the Admiralty (looking only to the narrow channel which separates New Guinea from Cape York) will lend a helping hand in such a survey, as soon as circumstances will permit.

New Zealand.—From Australia and tracts lying to the north of it, let us turn to the southern portion of Australasia, New Zealand; where, despite the war which has unfortunately prevailed in the northern island of the group, great advances have been made in delineating the physical geography and geological structure of the provinces of Canterbury and Otago, in the middle island.

Three Papers of great interest have been communicated to the Society, which throw additional light upon the physical geography of the hitherto unsurveyed districts of the great middle island of New Zealand, and contain new facts illustrative of glacial action. I consider it, indeed, to be a fortunate circumstance for our science, that these regions should have been visited by such men as Dr. Hector, Mr. M'Kerrow, and Dr. Haast. We may now compare their observations with those of Professor James Forbes and others in the Alpine regions, and those of Dr. Thomson and Dr. Hooker in the Himalaya Mountains, of which I shall have occasion to speak at some length in explanation of my own views as a geologist upon this interesting topic of glacial action.

The first of these papers to which I call your attention is that which relates to the successful journey across the province of Otago, by my friend Dr. Hector, so distinguished already by his explorations in North America and British Columbia. Leaving the town of Oamaru, his party proceeded by the right bank of the Waitaki River, and then, following the course of the tributary Ahuriri, crossed Robinson's Saddle. At the Wanaka Lake the party left the outposts of the settlers, and proceeded into the *terra incognita* by way of the Matukituki River, which empties itself into the lake upon its western shore. Forming a central camp here, Dr. Hector with two men proceeded up the valley, and after exploring in a northerly direction, without success, for an available route, advanced on foot, and reached the glaciers which form the source of the river. Ascending a saddle-shaped mountain by a steep climb, partly over the glacier, they found its elevation to be 5500 feet above the sea. The view obtained of the mountains was extensive and grand; Mount Aspiring, enveloped in ice, 10,000 feet high, on the right; and Mount Richards, with its enormous glacier which forms the source of the Jackson, on the left. It was here that the track of gigantic birds, supposed to be the Dinornis, which was first taken for a native pathway, was observed. After a vain endeavour to follow the course of the Jackson River to the sea, owing to the density of the woods, they were compelled to return, having reached a point 8 miles from the west coast.

Another Paper on New Zealand is a Reconnaissance Survey of the Lake districts of the Otago province, by Mr. M'Kerrow, who states that 4883 square miles have been surveyed and classified into Pasture, Forest, Lake, Barren, and Swamp. The bearings of the survey from the true meridian and a datum line for altitudes are given. In his remarks upon the configuration of the country, Mr. M'Kerrow calls attention to the great and sudden differences of elevation that diversify its surface. The mountains rise from 4000 to 9000 feet, and the line of perpetual congelation in that latitude has been determined to be 8000 feet. The mountain-ridges lying in a N.N.E. and S.S.W. direction, are directly athwart the track of the prevailing wind from the Pacific Ocean; and it was noticed that the snow-line on the north-west side (the side exposed to the wind) of the mountain-ridges was higher than upon the south-east or the sheltered side; thus showing that the wind has a very decided influence in producing this effect. The flood-marks show a rise and fall of water almost incredible, and the deltas at the mouths of the rivers are invariably and rapidly advancing into the lakes. The value of the latter as reservoirs, restraining the floods, is particularly expatiated upon, and the greater extent of the lakes at a former period is pointed out; while attention is called to the varied influences at work which produce a condition of "unstable equilibrium" in the atmosphere, producing storms of great violence.

The third Paper is a most important account of the highly interesting journeys of the provincial geologist, Dr. Haast, of whose deeds I was led to augur most favourably, in consequence of the high character which he brought with him from Vienna, as testified to me in a letter from my eminent friend, M. von Haidinger. In the year 1861, the rivers Ashburton and Rangitata were traced by Dr. Haast to their sources in Mounts Arrowsmith and Tyndall. In 1862, the course of the River Tengawai was followed, and the mountain-range crossed to Lake Tekapo, the affluents of which were traced to the Godley Glacier and Mount Darwin. Lake Pukaki was visited, and its sources in the declivities of Mount Cook ascertained; and the Naumann Range, from whence the Dobson and Hawkins take their rise and flow into Lake Ohau, was explored.

In 1863, Dr. Haast proceeded from the Orihi River along the coast to the Waitaki River, which he ascended, and followed the course of its first tributary on the left bank (the Ahuriri) to its source, visiting also the western shore of the Ohau Lake. The Hawea Lake was crossed from south to north, and the River Hunter explored to its source in Mount Ward. Lastly, the Wanaka Lake was traversed; the River Makarora traced to its origin, from whence he crossed over a pass, 1012 feet above the sea, and descending a river (which has since very properly been called the Haast), he reached the western shore of the island near Open Bay.

As a general commentary upon these remarkable journeys, Dr Haast observes, like Mr. M'Kerrow, that a longitudinal mountain-chain of great magnitude, forming the watershed of the island, runs from north-east to south-west. The continuity of this chain is broken through only in a very few places, otherwise it presents high and abrupt walls of great altitude throughout its whole length in the Canterbury province, wherein it reaches an estimated height of 10,000 feet. Dr. Haast describes the different passes through this chain, and in particular that pass which he considers to be unique in physical geography, and through which he penetrated to the western shore of the island, over a ridge not more than 1012 feet high.

In the course of these explorations he has availed himself of the opportunity of remarking and commenting upon the features of glacial action, which he has thoroughly described in all its different phases, and illustrated by a series of very beautiful, coloured sketches upon a large scale. The sketches are now deposited in the archives of our Society, and, together with the admirable description which accompanies them, will enable the physical geographer to compare the results of Dr. Haast's observations with those which have been made amid the glaciers of the Alps and of the Himalaya Mountains.

In one of his interesting communications, Dr. Haast describes the zealous efforts made by Mr. Whitcombe, after traversing these Alps, to reach the mouth of the Taramakau River; and I must refer you to our 'Proceedings,' vol. viii. No. 3, p. 58, for a very touching account of the manner in which that excellent scientific observer lost his life.*

It appears that Mr. Albert Walker, with his brother and Mr. M'Farlane, passed through a country on the west coast which had hitherto proved inaccessible, *i. e.* from the mouth of the Taramakau river to that of the Wanganui. Mr. Walker sent his account of this arduous journey to our late Assistant-Secretary, Mr. Greenfield; but through the confusion incident to the illness and death of that gentleman, this document has not yet been read or noticed.

As your attention was directed at the last Anniversary to the rapidly increasing produce of gold in the western parts of the province of Otago, it is unnecessary that I should recur to that important feature in the structure of New Zealand.

AMERICA.

British Columbia and Vancouver Island.—Though unable to comprise within the limits of a short memoir any detailed description of British Columbia, Lieutenant Palmer, R.E., who has served in that

* I earnestly hope that chromo-lithographic copies of those very remarkable coloured sketches of the New Zealand Glaciers will be soon published. Glacialists and Alpine travellers should possess them.

colony four years and a half, has given us a very clear and sensible sketch of the geography and chief capabilities of that vast, and, as yet, very imperfectly explored region. Subtended on the west by the densely-wooded coast or Cascade range, with its long and deep bays, and on the east by the flanks of the much loftier Rocky Mountains, a band of plateau-like and undulating country, of about 100 miles in breadth, watered by the Fraser and its tributary streams, is the tract which may eventually be best rendered capable of yielding produce for the support of the mining population. The chief gold mines, which lie in the mountainous tract of Cariboo, to the east of the plateau land watered by the Fraser, are well described, and we learn how the earlier proprietors traced up the precious metal, from the banks of the Fraser and Thompson Rivers, till they reached those western watersheds of the Rocky Mountains, in which, doubtless, vast amounts of mineral wealth lie hidden. The picture of the difficulties which the miners have to encounter is thoroughly well drawn, whether as to the want of provisions, or the excessive cold, and all the disadvantages of a new settlement in a wild and sterile land. In fact, gold mining is only beginning in British Columbia, and the few creeks in which diggings have been so successful will be followed up by discoveries of gold in the quartz veins of the slaty rocks. In British Columbia, as in California and Australia, those quartz reefs, be they veins or altered beds, range from north to south, or rather from north and east to south and east. Now, when we correlate this fact with similar data, as obtained from the auriferous regions of Australia and Russia, in all of which, as well as throughout the great chain of the Andes, the same prevailing north and south strike of the quartz bands is dominant, science has still to search for an explanation of this most striking physical phenomenon, to which I have directed attention in several publications upon the distribution of gold.*

The memoir of Lieutenant Palmer is concluded in the following words, which are, I think, entirely borne out by the facts he has adduced:—"From its geographical position, its mineral wealth, the great salubrity of its climate, and its valuable natural products, British Columbia, with good management and by a process

---

* See 'Russia and the Ural Mountains,' vol. i. p. 472 *et seq.*; 'Siberia,' 2nd edit. pp. 479 *et seq.*; Addresses to the British Association, Royal Institution, Royal Geographical Society, *passim*; and several other works, from 1846 to 1850, including the article in the 'Quarterly Review' of 1850, entitled "Siberia and California."

of gradual development, is likely to take rank as not the least important of the Colonies of the Crown."

This opinion has been ably sustained by Colonel Moody, under whom Lieutenant Palmer served, and who, from having been a Crown Commissioner for some time, is a most competent and reliable authority.*

Thanks to the admirable Nautical Surveys, chiefly conducted by that able hydrographer, Captain Richards, who now directs the construction of all the charts of the Admiralty, the singularly diversified coasts of the noble island of Vancouver have been accurately delineated. Fortunately for our science, Captain Richards had a medical officer on board his ship, Dr. C. Forbes, R.N., who has brought out, in a most efficient manner, all the data relating to its resources and capabilities as a colony. In introducing his subject, the author well says, that "the romance and mystery which hang over the scenes first visited by Cook and Vancouver, have now given way to a hopeful reality, and the emigrant sees before him a land full of promise and of hope."

After an excellent descriptive sketch of the whole region, Dr. Forbes dilates on its physical geography, geology, hydrography, and meteorology, and then treats of the political geography and statistics of the rising colony; so that I can safely refer any one who wishes to obtain a true acquaintance with this great flanking buttress of British Columbia—this key to the influence which a British fleet must ever exercise in the Pacific—to the valuable Memoir of Dr. Forbes, which will soon be printed in our volume, and also to a valuable Prize Essay by him, published by the Colonial Government. The author expresses his sense of the impossibility of doing justice to all the resources and capabilities of Vancouver Island: but in pointing to it as a commercial emporium between two great wealth-producing countries, to the certain rewards attending steady industry, the prospect of good settlements, and the excellent system of education established for the youthful part of the colony, all these, he justly says, are "sound attractions, to draw thither the capitalist, merchant, working farmer, miner, and skilled mechanic, and even the honest labourer." †

South America.—In South America, steam navigation and railroads are fast adding to our knowledge of rivers and lands hitherto very imperfectly described.

---

* See 'Proceedings,' vol. viii. No. 3, p. 91. † See 'Proceedings,' vol. viii. No. 3.

The Survey across the Upper Provinces of the Argentine Republic, for Mr. Wheelwright's gigantic scheme of a railroad over the Andes to unite the shores of the Pacific with those of the Rio de la Plata, has led to the collection of fresh information regarding those provinces. Mr. Hutchinson, H.M. Consul at Rosario, on the Parana, from whence the railroad is to run to Cordova, has lately made a journey through them, of which he has transmitted the details to this Society through the Foreign Office, with an excellent map by Dr. Burmeister (now Director of the Museum of Natural History at Buenos Ayres), containing corrections made by himself and by Mr. Coghlan, one of our Fellows who is engaged in engineering works of considerable importance for improving the navigation of the great river Salado, which runs through them—information which will be very useful to geographers. (See Stanford's New Map of South America.)

With reference to Mr. Wheelwright's project, recent advices from Chile allude to the Survey of a Pass by the Planchon over the Andes, in about lat. 35°, to the south of the province of Mendoza, communicating with Curico in Chile, through the valley of the river Teno—which seems to offer on many accounts a better line for the projected extension of his railroad from Cordova than that originally projected by La Rioja to Copiapo; the elevation of the Pass in question not exceeding 6000 feet instead of 16,500, the height to be surmounted according to the first plan described in Mr. Wheelwright's Paper in the 31st volume of our Journal, and which was reconsidered at the last meeting of the British Association.

This Pass, now called a new discovery, appears to be the same as that called De las Damas, or The Ladies' Pass, which was carefully examined sixty years ago by a Spanish officer, Zamudio, who reported to the Viceroy of Buenos Ayres that it might be made practicable for wheel carriages at a very small expense. His account of it is given in De Angelis' Collection of Records of the Rio de la Plata, a copy of which is in our Library.

One of the most interesting Papers read this year to the Society is the narrative, translated from the Spanish, and communicated by Sir Woodbine Parish, of Don Guillermo Cox's journey by a Pass over the Andes to the south of Valdivia, not 3000 feet high, to the great lake of Nahuel-Huapi, on the eastern side of the Cordillera, and of his descent for the first time of the river Limay, which falls into the Negro, and which, from its junction with the Limay, was ascertained to be navigable throughout its whole course across Patagonia to the Atlantic, eighty years ago by Don Basilio Villarino, whose

Diary, also communicated to us by Sir Woodbine Parish, is given in the 5th volume of our Journal.

Señor Cox, though prevented by an accident to his boat from completing his object of passing down the Negro to the Buenos Ayrean settlement of Carmen at its mouth, has had the satisfaction of uniting his work with Villarino's Survey, and of proving that from the lake of Nahuel-Huapi, on the eastern side of the Andes, there is a continuous water-communication to the Atlantic, the future importance of which it is difficult to estimate.

The observations which, on the reading of this memoir, fell from our medallist Admiral FitzRoy, who so distinguished himself in the survey of all the coasts of the southern extremity of America, including a visit to a portion of the region explored by Señor Cox, will be read with deep interest.*

Sir Woodbine Parish, who perhaps has studied the geography of that part of South America more than any other living individual, and who spoke so effectively on the same occasion, is of opinion that Señor Cox's exploration, made under great difficulties and entirely at his own cost, deserves the highest commendation. A detailed account of his travels and adventures amongst the Indians who inhabit the eastern sides of the Andes has been published in Chile, in a volume replete with information regarding the habits and customs of those tribes, as well as on the topography, botany, and geology of that part of the Andes. A copy of the work has been transmitted to me, and it is to be hoped that some one will undertake to publish a translation of it, for the benefit and instruction of all who are interested in the present and future of those countries.

I may add, in relation to this portion of the continent, that, in the Bulletin of the French Geographical Society for March and April, 1864, there is a memoir by Mons. B. Poucel on the province of Catamarca, one of the remotest and least known of the districts of the Argentine Republic. The memoir contains much information on the climate, productions,† and trade of the country, as well as many corrections of errors existing on all the maps of the region published

* See 'Proceedings,' vol. viii. No. v. p. 161.

† Some interesting facts relative to the climate, pasturage, and productions of the Falkland Islands are given by Admiral Sullivan in a letter to the 'Times,' dated Dec. 31, 1863. He resided there during three winters and two summers, and made large experiments on the capabilities of the colony for grazing purposes, having had 1400 head of wild cattle tamed, and leased 40,000 acres of land. Speaking highly of the climate and pasturage, he strongly recommends that the eastern island be made a penal settlement.

in Europe. Mons. Poucel has spent thirty years of his life in these countries.

We are indebted to Mr. Hinchliff, one of the Fellows of this Society, and well known as an adventurous member of the Alpine Club, for a very graphic account of a tour made by him last year in Southern Brazil and the Eastern Provinces of the Rio de la Plata, under the title of '*South American Sketches*,' in which his vivid descriptions of the excitement of life amongst the Gauchos are such as, I doubt not, will lead other equally enterprising spirits to follow his good example, and bring us fresh stores of information from those new countries, especially when they learn from Mr. Hinchliff's book how easily they may be reached; "for," as he says, "the limits of a barrister's long vacation are sufficient to allow of his passing five weeks in the cool season amidst the glorious vegetation and unrivalled scenery of Brazil."

The peopling of the fertile plains of the River Plata is now progressing with great rapidity; and as exact information on the nature of the new population which is pouring into these southern parts of America is not easy to procure, a memoir,* recently sent to this Society by our Corresponding Member, Signor Cristoforo Negri, is worthy of mention, as supplying data showing the large Italian element that these growing new countries will contain. The result of Signor Negri's inquiries is that, at least, 8000 Italians annually leave the ports of Italy for this region; and that 100,000 emigrants have departed within the last 25 years, the number still increasing from year to year. This drain is from the most industrious classes of the population, and the advantages to the Spanish republics are correspondingly great; for, according to Signor Negri, all but an insignificant fraction naturalize themselves in their new home.

While on the subject of South America, I have pleasure in announcing that the indefatigable explorer, Mr. Richard Spruce, who has for fifteen years been unceasingly employed in scientific labours in the valley of the river Amazons, and in the Andes of Ecuador, is on his way to England. Of his great services to botany it is not for me to speak, but his geographical work is fully entitled to special notice at my hands. Mr. Spruce left England in the year 1849, and landed at Pará, whence he proceeded up the river Amazons, and explored several of its least-known affluents. In 1849 he ascended and made a map of the river Trombetas, an

* See the 'Corriere Mercantile,' Genoa, 29th September, 1863.

important tributary of the Amazons which was hitherto unsurveyed. In 1853 and 1854 he ascended the Rio Negro, Cassiquiari, and Orinoco, exploring and mapping the river Cunucunúma, a tributary of the Orinoco, and the river Pacimoni, which flows into the Cassiquiari. The maps of these three rivers were made by means of cross bearings and astronomical observations, and will form an important addition to geographical knowledge. During the years 1855 and 1856 Mr. Spruce ascended the river Huallaga, and in 1857 he successfully surmounted all the difficulties of the navigation of the rivers Pastaza and Bombonaza, and reached the Andes of Quito. He has since been engaged in exploring the southern part of the republic of Ecuador; and during 1860 he was employed by the Secretary of State for India, in co-operation with our Secretary, Mr. Clements Markham, in collecting *chinchona* plants and seeds in the forests at the foot of the mountain of Chimborazo.

After fifteen years of such incessant toil in the cause of science, exposed to innumerable dangers and privations, the health of Mr. Spruce has been much impaired; but I trust that the renovating air of his native land will restore it, and that geographers, as well as botanists, will be put in possession of the fruits of his valuable researches.

I conclude my notices of South American explorations, by observing that travellers or emigrants intending to proceed to Brazil, or to any part of the River Amazons, will find a very convenient hand-book for their guidance in a small volume published by Mr. Belmar, a French gentleman, entitled, '*Voyage aux Provinces Braziliennes de l'Amazonie, en* 1862; *précédé d'un rapide coup d'œil sur le Littoral du Brazil.*'

Glaciers.

Glaciers of the Himalaya Mountains and New Zealand compared with those of Europe.—On the Powers of Glaciers in modifying the Surface of the Earth, and on the Agency of Floating Icebergs.—In the last Anniversary Address* I directed your attention to the state of Greenland as it is, in order to impress upon the minds of our Fellows who have not attended to the connection between existing geography and the ancient conditions of the globe, that Scotland and large

* See 'Proceedings,' vol. vii., No. 4, and 'Journal,' vol. xxxiii.

portions of Northern Europe must, at a period anterior to the creation of man, have been in the same condition as that in which Greenland and its adjacent seas are now. In other words, that, in the glacial epoch of geologists, certain elevated tracts were permanently occupied by fields of snow, with glaciers descending from them to the bays and cliffs of the sea, and that the erratic blocks which we now find spread over central England and the plains of Germany are simply the relics of icebergs which floated over wide tracts then submerged, and which, on melting, dropped them on the then sea bottom.

In the last session the vivid descriptions of the glaciers of Western Tibet, by Captain Godwin Austen, and of the glaciers of the middle island of New Zealand, by Drs. Haast * and Hector,† have specially attracted the attention of the Society; and I am therefore led to dwell on these grand terrestrial phenomena by giving a general view of the results of glacial action, both terrestrial and subaqueous.

When the first of those Memoirs was read, Dr. Hugh Falconer, who had passed several years in that same region of the Tibetan Himalayas, enlarged upon the scenes which had been so graphically delineated on maps by Captain Godwin Austen. He then referred us to the works of those who preceded and followed him in examining that region, and reminded us of the names of Moorcroft, Trebeck, Jacquemont, Vigne, Strachey,‡ and Thomson.

In considering the subject of glaciers, I am bound specially to call

* Dr. Haast (as before-mentioned) has sent to our Society a series of coloured sketches of the Glaciers of the Western Coast of the Province of Canterbury, which for striking effect seem to me never to have been surpassed by any delineator of icy regions. The juxtaposition of these glaciers to a splendid forest vegetation, and amidst mountains which are close to the sea, and yet rise to 10,000 feet above it, the depth of the gorges, and the height of waterfalls issuing from the ice, are all very remarkable.

† By a letter just received from Dr. Hector, dated 20th January, 1864, I learn that not only has he ably explored the region occupied by glaciers in the province of Otago, but has also visited, in a steamer, the wonderful fiords on the western side of the island. He is now preparing a work on the geological structure of the colony, in which he will show that the lakes on the eastern slopes of the country are true rock basins, which were once occupied by glaciers, and the bottom of one of which sounded by him has a depth of 1250 feet, or considerably below the sea. Although Dr. Hector does not go so far as to express his belief that these rock-basins have been scooped out by ice, he suggests that they have been filled and shaped by glaciers. He avows, however, that he has to read up much on this subject, and I only regret that this portion of my Address cannot probably be in the hands of my distinguished friend before his final conclusions may be published.

‡ In 1847 Lieut. R. Strachey visited and described the glaciers of the Pindur and Kuphinee Rivers, and applied to them the excellent Alpine classification of Professor James Forbes.

your attention to the last-mentioned of these explorers, Dr. Thomson, who first well defined the characters and extent of the glaciers of Western Tibet. In addition to a masterly description* of the physical geography of the regions he traversed, the work of Dr. Thomson is also so rich in botanical, climatological, and geological researches as to be a model for geographical explorers. Thus, his original observations on the enormous lacustrine deposits, replete with the remains of fresh-water shells, accumulated formerly at vast heights above the sea, are to my mind the grandest and clearest proofs of how the feeders of the Indus in bygone periods were dammed up by rock barriers, which later acts of upheavement may have disrupted, or by gigantic transverse or terminal glaciers and their moraines. In truth, therefore, the parallel roads of Lochaber in our Highlands, to which I adverted last year, have their grander analogue in the vast horizontal terraces of the mountains of Tibet. Again, among the remarkable data set before us in that work, is the striking fact that in the trans-Sutlej region of the Himalayas, the glaciers which descend from the southern flank of a range of mountains are longer than those which occur on the northern flank of the same. This is accounted for by the author on the grounds of the great amount of moisture proceeding from the ocean being arrested and condensed into snow by the first great range of heights which it encounters. The same phenomenon was, indeed, met with in Sikhim by Dr. Joseph Hooker, in the eastern portion of this great chain. Unlike his precursors, Thomson, when he wrote, was already conversant with the true laws of glacier movements, as well as the most remarkable of their effects, as pointed out in various works by Agassiz and other writers upon the Alps, and he specially refers to Professor James Forbes; for, though many an ardent traveller had preceded him, Thomson was the first who clearly distinguished the glaciers of the Himalayan Mountains from the snows whence they issued, and who at the same time pointed out the lateral and terminal moraines which they evolved. That which Thomson did for the western or Tibetan portion of this lofty chain of mountains was, in like manner, admirably done by Dr. Joseph Hooker for the eastern mountains of Sikhim, in his most attractive work.†

All these observers, whether in India or in New Zealand, have taught us that the glacial phenomena, though on a much grander scale in the Himalayas, are precisely analogous to those in Europe.

* 'Travels in the Western Himalayas and Tibet.' 1852.
† See 'Himalayan Journals.' 1854.

The application, however, of accurate topographical surveying, and the ascertainment of the precise length and breadth of those grand rivers of ice, were wanting. Captain Godwin Austen has effected this, as regards those vast glaciers proceeding from the Mooztagh, which lie to the west of those descending from the Karakorum Pass, described by Thomson. Having measured the length and breadth of these masses, he has enabled us to know that one of them, which feeds the powerful affluent of the Indus called Shiggar, has a length of 36 miles, and is therefore upwards of three times the length of any existing glacier of the Alps; though it will presently be shown that some of the old Alpine glaciers were considerably longer. Well, indeed, may we account for these enormous dimensions now existing in the Himalayas, when we recollect that the passes by which travellers proceed to Yarkand have a height of 18,000 feet, and that the great Karakorum Peak rises to 28,200 feet, above the sea. Captain Godwin Austen is, I understand, about to explore the great *terra incognita* which the Burhampooter is supposed to traverse in the upper part of its course, and we may confidently hope that, at no distant day, this energetic young officer will ultimately obtain the highest honours of this Society.

In the discussion which followed the reading of the memoir of Captain Godwin Austen, Dr. Falconer grappled most ably with the novel theory that the lakes of the Alps owe their origin to the erosive action of ice, which, descending from former great glaciers, has excavated or scooped out the cavities now filled with water. Being one of the few men who have personally examined the glaciers both of the Himalayas and the Alps, his reasoning from observed facts is most valuable. Believing, with the vast majority of practical geologists, that the irregularities of the surface of the Alps have been primarily caused by dislocations and denudations, he gave it as his opinion that the Alpine cavities, having been filled with ice during the glacial period, were thereby protected from the influx of the vast masses of the detritus hurled down in the moraines of gigantic glaciers that passed over these countries on solid ice, which, on melting, left the depressions in the condition of lakes. On the southern flank of the Himalayan mountains, on the contrary, where ice has not acted as a conservative agent, the valleys have been choked up with débris, but no great lakes exist. Dr. Falconer expressed the same views at an evening meeting of the Geological Society, on the 5th March, 1862, but it is not the practice of that body to record the opinions of speakers.

In alluding to this original view of Dr. Falconer, and to his able illustration of the whole subject, as detailed in our Proceedings,* I am bound, as a geologist, not to shrink from stating that I agree with him. I beg also to take this opportunity of recording my own opinion of the effects which glaciers have produced in those tracts where they formerly existed, or where they now prevail, as founded on the observations of many good observers, as well as on my own researches. Until lately geologists seemed to be generally agreed that most of the numerous deep openings and depressions which exist in all lofty mountains were primarily due to cracks, rents, and denudations, which took place during the various movements which each chain had undergone at various periods. These apertures, it was supposed, were necessarily enlarged by long diurnal atmospheric agency and the action of torrents carrying down boulders and detritus; such action being most intense in those mountains where snows and glaciers prevailed, the melting of which necessarily produced great débâcles. In the place of this *modus operandi*, another theory has been applied to all those mountains, which, like the Alps, have been for long periods the seat of glaciers.

Before I enter on the consideration of the new theory of the power of moving ice, let us take a review of the progress recently made in pointing out the extent to which ancient glaciers and their moraines have ranged within or on the flanks of the Alps. In the northern portions of the chain these phenomena long ago attracted the attention of some admirable observers. Originating with Venetz and Charpentier, the true active powers of glaciers were defined by Rendu, Agassiz, and Forbes, and subsequently by the other explorers. In short, no doubt any longer obtains, that such was the powerful agency of the grand ancient glaciers, that blocks of crystalline rock were transported by them from the central Alps of Mont Blanc to the slopes of the Jura Mountains When, however, we begin to seek for satisfactory explanations of the method of transport of these huge erratics, geologists (who are only geographers of another order) entertained different opinions. For my own part, I have had strong doubts as to whether the great blocks derived from Mont Blanc, and which lie on the slopes of the Jura, were ever borne thither by a vast solid glacier which advanced from the Lake of Geneva over the Cantons of Vaud and Neufchatel. Whilst fully believing in the great power of glaciers and their

* 'Proceedings of Royal Geographical Society,' vol. viii. p. 38.

agency, my opinion was that these blocks were rather transported to their present habitats on the Jura on ice-rafts, which were floated away in water to the N.N.W., when the great glaciers melted, and the low countries were flooded. I founded this opinion on the fact, that in examining the Canton de Vaud, and particularly the tracts near Lausanne and the north side of the Lake of Geneva, I never could detect the trace of true moraines. In that detritus I saw merely accumulations of loose materials, which had all the aspect of having been accumulated under running waters. But, even granting to the land-glacialists their full demand, and supposing that a gigantic glacier was formerly spread out in fan shape, as laid down by several geologists and recently in the little map of Sir Charles Lyell, in his work on the Antiquity of Man, and that it became eventually of such enormous thickness as to have carried up the great blocks on its surface, to lodge them on the Jura Mountains; there is still in it nothing which supports the opinion, as indeed Sir Charles has himself observed,* that the deep cavity in which the lake lies was *excavated* by ice.

The geologists who first embraced the view of the transport of the huge blocks on the Jura by a solid glacier, were of opinion, that the great depressions and irregularities of the surface which we now see between the Alps and the Jura, including the Lakes of Geneva and Neufchatel, were so filled up with snow and ice, that the advancing glaciers travelled on them as bridges of ice, the foundations of which occupied the cavities.

Let us now turn to the south side of the Alps, where a long incline accounts for the enormous extension of glaciers into the plains o Italy. Thus, in examining the remains of the old glaciers which once advanced into the valley of the Po, MM. Martins and Gastaldi show us, that one of those bodies extended from Mount Tabor to Rivoli, a length of 50 miles; and, therefore, was longer than any existing glacier described on the flanks of the Himalayas; † whilst those to the south of the Lago di Garda are shown to have had a much greater length. Demonstrating, along with many other authors, how these old glaciers had striated and polished the hard rocks through or on which they had advanced, these authors also clearly pointed out how the course of the glaciers had been deflected, so as to take a new direction, when they met with the obstruction of any promontory of hard rock. Further, M. Martins, being well

---

* See 'Antiquity of Man,' p. 312. † Bull. Soc. Géol. de France. 1850.

acquainted with Norway, indicated that, just as in that country, the face of each rock in a valley was rounded off, polished, and striated where it had been opposed to the advancing mass of ice, and that its opposite or downward face, over which the ice had cascaded or tumbled, was left in a rough state; thus exhibiting the worn or "stoss-seite," and lee, or protected side, of the Scandinavian geologists. The subsequent works of M. Gastaldi on the geology of Piedmont, in 1853 and in 1861, bring within well-defined limits the phenomena of old moraines and ancient drift, and prove that the débris carried over each gorge and valley has been derived from the rocks which specially encase such depressions. He also clearly demonstrated that in many of these cases the gigantic boulders, which are piled together and present the character of a cataclysmal origin, can all be accounted for simply by the power of advancing ancient glaciers. In these works M. Gastaldi very properly distinguishes between the erratic blocks which were evidently parts of old terrestrial moraines, and those which, associated with tertiary strata, are found in deposits with marine shells —the larger erratics in the latter, as in the Superga, having been transported in masses of ice which floated on the then sea.

Various other Italian authors have occupied themselves with glacial phenomena (particularly Omboni, Villa, Stoppani, Cornalia, Paglia, Parolini, &c.): the conclusion at which they have all arrived is, that there existed an enormous extension of the moraines sent forth by the ancient Alpine glaciers into the great valley of the Po. Geographers who have not studied the phenomena may well indeed be surprised when they learn that the hills to the south of the Lago di Garda, and extending by Pozzolengo and Solferino to Cavriano,* or the very ground where the great battles of the year 1859 were fought (the hill of Solferino being 657 English feet above the sea), are simply great moraines of blocks and gravel, produced by the advance of former glaciers which issued from the southern slopes of the Alps.

Combining these observations with others of his own on the lake of Annecy, M. Mortillet suggested in 1862 a new theory, in attributing to the descent of the glaciers a great excavating power. Believing, with all those who have been named, as well as the most eminent of the Swiss and French geologists, that the last great upheavals and denudations of the Alps had produced the irregularities

* See Paglia—'Sulle Colline del Terreno Erratico all' estremità meridionale del Lago di Garda' (with map).

of their surface, he inferred that before the glacial period began, the débris derived from the wear and tear of the mountains by watery action had, to a great extent, choked up the valleys and filled the rock-basins. He further believed that, in the cold period which followed, great glaciers, descending with enormous power, forced all such débris out of the original rock-basins, and left them to be occupied by the present lakes. It is proper here to state that M. Gastaldi was right, as well as M. Mortillet, who followed him, in presuming that great deposits of old water-worn alluvium or loose drift were accumulated before the formation of glaciers, inasmuch as the oldest moraines are seen to repose in many places on the former. It will presently be shown that this fact contains within it the proof that the glaciers were not and are not in themselves excavating bodies.

Preceding M. Mortillet, however, in reasoning upon the excavating power of former glaciers, my eminent associate Professor Ramsay had broached a much bolder theory. In his essay entitled 'The Old Glaciers of Switzerland and North Wales,' published in 1859, and re-published with additions in 1860, he expressed the opinion that the excavation of deep hollows in solid rocks was due to a weight of superincumbent ice pressing and grinding *downwards and outwards*, over high, flat, and sometimes broad watersheds and table-lands, during that period of intense cold which produced the old glaciers.* In 1862 he went still further; and whilst M. Mortillet was communicating his views on the Continent, Ramsay, wholly unconscious of what M. Mortillet was doing, read a memoir to the Geological Society of London, showing that all the cavities occupied by lakes in Switzerland and the North of Italy had been excavated originally by the action of glacier ice. Whatever, therefore, be the fate of this ingenious view, Professor Ramsay has our thanks for having excited much useful inquiry, and for having compelled old geologists like myself to reconsider our conclusions.

If the view of M. Mortillet has been met with objections, still more is the theory of Ramsay opposed, and particularly in foreign lands. In this country it has indeed met with the most vigorous opposition on the part of Dr. Falconer, as recorded in our Proceedings; and even Sir Charles Lyell, the great advocate of the power of existing causes, has stoutly opposed this

* See 'Peaks, Passes,' &c. (Alpine Journal, 1859), and 'The Old Glaciers of Switzerland and North Wales,' London, 1860, p. 110.

bold extension of a most powerful *vera causa*.* Having explored the Alps, at various intervals, for upwards of forty years, I long ago came to the conclusion that their chief cavities, vertical precipices, and subtending, deep, narrow gorges, have been *originally* determined by movements and openings of the crust, whether arranged in anticlinal or synclinal lines, or not less frequently modified by great transversal or lateral breaks, at right angles to the longitudinal or main folds of elevation and depression. Explorations of other mountainous regions, in various parts of Europe, have strengthened this conviction. I rejoice, therefore, to find that those geologists of Switzerland, who justly stand at the head of their profession, Professor Studer and M. Escher von der Linth, have sustained, by numerous appeals to nature, the views I hold in common with the great majority of geologists. Those Swiss explorers, who have laboured for many years in their native Alps, and have constructed admirable geological maps of them, must surely be well acquainted with the ruptures of the various rocks, the outlines of which they have sedulously followed. Now, they attribute most of those deep cavities in which the rivers and lakes occur either to dislocations producing abrupt fissures, or to great foldings of the strata leaving openings upwards where the tension has been the greatest—openings which were enlarged by powerful denudations. Numerous geologists have recently expressed their concurrence in the generally-adopted view, that the Alpine lakes occupy such orographic depressions; and, by close researches, my accomplished friend Mr. John Ball † has ably sustained this view, and has further shown how slight is the erosive power of a glacier even when issuing from its main source. No one of them, in short, any more than Professor Studer and myself, doubts that the origin of these lakes is primarily due to other causes. Nor am I aware that any geologists of France and Germany, much as many of them have examined the Alps, have deviated from the opinion that the main diversity of outline in that chain was due to ruptures and denudations that occurred during the upheavals of the chain.

On the other hand, I am bound to state that, although the new theory has met with little or no favour on the continent of Europe, it is supported by our able geologists, Jukes and Geikie. Again, whilst Ramsay extended his view to the great lakes of the Alps, the eminent physicist Tyndall speculated even upon all the Alpine

* See 'Antiquity of Man,' pp. 316 *et seq.*

† See 'Phil. Mag.' 1863.

valleys having been formed by the long processes of the melting of snows and the erosion of ice.* With every respect for the reasoning of my distinguished countrymen, I rely upon my long acquaintance with the structure of the Alpine chain; and now that I see sound practical geologists, who have passed their lives in examining every recess of those mountains, rejecting this new theory, and pointing out, in place of it, the proofs of ruptures and denudations in the chain, I adhere firmly to the view I have long entertained.†

Those who wish to analyse this matter, must consult the admirable essay of Professor Studer on the origin of the Swiss lakes.‡ They will find numerous proofs of the views sustained by the leader of Alpine geologists. He shows you, indeed, how many of the rivers now flow in fissures or deep chasms in very hard rocks of different composition; chasms which water alone could never have opened out, particularly in those cases where the river has left a softer rock, and, with very slight obstacles to its straight course, has availed itself of one of these deep transverse natural gorges, which have evidently been produced by a great former rent. My personal observations in the Alps, Carpathians, and Ural mountains enable me to confirm this view. As regards the continent of Europe, I should transport you to the Rhine, the Danube, and other great streams, which, flowing through flat countries, with little declivity, never could have eroded those deep, abrupt gorges through which they here and there flow, and which are manifestly due to original ruptures of the rocks.§

---

* See Tyndall on the Conformation of the Alps, 'Phil. Mag.' vol. xiv., 1862, p. 169, and also Ramsay on the Excavations of the Alps, xvi. p. 377.

† Some remarkable facts have been mentioned to me in a letter by M. Escher von der Linth, as proving the inapplicability of the ice erosion theory to the Swiss lakes. 1st. That the glacier of Rosenlaui, which descends from a great altitude, does not enter a low deep narrow gorge of the valley, but forms a bridge over it; and so it is to be inferred, that, as the ancient glacier did not excavate this gorge, still less did it excavate the great valley in which the present glacier is embosomed. Again, he points out that, as the bottoms of many of the Swiss lakes are below the level of the sea, the glacier which is supposed to have excavated the hollow would have to ascend considerable heights to emerge from the depression which it had excavated—an impossible movement, and contradicted by the existing operations of all glaciers.

‡ 'Origine des Lacs Suisses,' Biblio. Univ. et Revue Suisse (Arch. des Sci. Phys. et Nat.) t. xix. liv. de Février, 1864; also Phil. Mag. vol. xxvii. p. 481.

§ The recent Russian exploration of Eastern Siberia has shown how the grand river Amur deflects suddenly at nearly right angles from its course in a comparatively low country, to take advantage of a deep natural rent in the mountains through which it escapes to the seaboard (see p. cxl. of the Address).

In holding these opinions as to the small power of watery or glacial action, when not acting on an adequate incline, I do not doubt that glaciers have been, and still are, most important agents in modifying the outlines of mountains. Their summits are, we know, continually degraded by rains and melted snows; and torrents flowing down from them and carrying much detritus, are, doubtless, deepening their channels wherever sufficient slopes occur. But to whatever extent this agency has been and is at work, and to however great a degree a descending glacier may scratch and round off the rocky bottom on which it advances, I coincide with Professor Studer, and many other observers, that the amount of erosion produced by these icy masses, particularly when they have advanced into valleys where there is only a slight inclination, must be exceedingly small. In valleys with a very slight descent it will presently be shown that, even in the Alps, no erosion whatever takes place, particularly as the bottom of the glacier is usually separated from the subjacent rock or vegetable soil by water arising from the melting of the ice. Again, in all the steeper valleys down which ancient glaciers have formerly descended, we do not find that either the sides or bottoms of the upper gorges afford any proof of wide erosion, but only exhibit the peculiar fashioning of the flanking surfaces of the rocks, or that rounding off and polishing, called *moutonné*, accompanied with striations. On the contrary, in gorges whence the largest glaciers have advanced for ages, we meet with islands of solid rock and little bosses still standing out, even in the midst of valleys down which the icy stream has swept.

With such proofs before us of what the frozen rivers called glaciers have done and are doing in the high valleys, how can we imagine, as Dr. Falconer has forcibly put it, that the glacier which is supposed to have occupied the Lago Maggiore, for example, and had advanced its moraines into the plains of the Po, should have had the power to plough its way down to a depth of 2000 feet below the Mediterranean, and then to rise up along an incline at the rate of 180 feet per mile? Nor can I admit the possible application of this ice-excavating theory wherever I see that a depression in which a lake occurs is at right angles to the discharge of an old main glacier. This is remarkably to be noticed in the case of the Lake of Geneva, which trends from E. to W., whilst the detritus and blocks sent forth by the old glacier of the Rhone have all proceeded to the N. and N.N.W.; or in direct continuation of the line of march of the glacier which issued from the narrow gorge of the Rhone. By what momentum, then, was the glacier to be so deflected to the west that it could channel or scoop out, on flat ground, the great hollow now occupied by the Lake of Geneva? And, after effecting this wonderful operation, how was it to be propelled upwards from this cavity on the ascent, to great heights on the slopes of the Jura mountains?

Still stronger objections exist to the application of the excavation theory to the Lake of Constance. There I have never been able to see on the northern flank of the Hohe Sentis, which presents its abrupt, precipitous, and highly dislocated and contorted jurassic and cretaceous rocks to the lake, with terraces of miocene deposits, at various heights,—there I have been unable, when with my indefatigable friend and companion M. Escher von der Linth, who knows every inch of the ground, to trace the signs of the action of a great glacier, which could, in its descent, have so plunged into the flat region on the east and north, as to have scooped out the cavity in which the Lake of Constance lies. In this case, indeed, there are no traces whatever of those great old moraines from the relics of which we infer that glaciers have formerly advanced; the level country to the north of the lake being entirely free from them.

Great orographic depressions and deep cavities, sometimes dry, sometimes filled with water, occur in numberless countries where no glaciers ever existed. Thus, in Spain, as my colleague M. de Verneuil assures me, the large depressions on either side of the granite mountains of the Guadarrama present exactly the appearance which a theorist might attribute to excavation by ice, and yet, however these cavities were formed, it is certain that no glacier has ever existed there. Nor, again, has ice ever acted on the sides of the steep mountains of Murcia, where deep excavations and denudations are seen upon the grandest Alpine scale.

If we transport ourselves from those southern climes to the northern latitudes of the Ural mountains, where doubtless ice and snow formerly prevailed to a greater extent than now, we do not there find any proof whatever of the action of glaciers; for the hills are much too low to have given propulsion to such masses. On the contrary, we know that great blocks of hard rocks have been transported to the foot of these hills from Lapland and Scandinavia, when, during the glacial period, a vast Arctic Sea watered the flanks of the Ural mountains, and when most parts of that low chain could then have been only slightly elevated above the waters. And yet on the sides of this chain, where no glaciers have ever so acted as to have produced erosion, we meet with both longitudinal and transverse deep fissures in some of which lakes, and in others rivers, occur. Thus, all along the eastern flank of the Ural mountains we find a succession of depressions filled with water without a trace, on the sides of the bare and hard rocks which subtend these lakes, of any former action of glaciers. Then, as to deep valleys in which rivers flow, let us take two out of the examples along the western flank of this chain, on which my companions De Verneuil, Keyserling, and myself have specially dwelt in our work on Russia. The Serebrianka river, as it issues from a network of metamorphic schists, quartz rocks, and marbles of Silurian age, exhibits on its rugged banks the extrusion of much igneous matter. This agency has split up the stratified deposits; and the necessarily accompanying movements have caused great openings, including the cavity in which the river flows. Or, when the geological traveller passes from the valley of the Serebrianka to that of its recipient, the Tchussovaya, still more is he struck with wonderment at the unquestionable evidences, amidst intensely dislocated rocks, of the ruptures by which the deep narrow chasm has been formed in hard crystalline rocks, in which a lazy stream flows, which, not descending from any altitude, has had no excavating power whatever, and, like our own meandering Wye, has flowed on through clefts in limestone during the whole historic and prehistoric period, without deepening its bed.*

But if rivers which are not torrential, and do not descend from heights, cannot possibly have produced, nor even have deepened, the natural hollows or chasms in which they flow, still it might be contended, that, what water has not effected, may have been done by a river, when, in the compacter form of ice, it descended and advanced across the lower country. Unluckily for the supporters of the ice-excavating theory, the data which existing nature presents to us, as before said, are decisively opposed to their view. The examination of those tracts over which glaciers have advanced, and from which they have retreated, shows, in the most convincing manner, that ice has so much plasticity that it has always moulded itself upon the inequalities of hard rocks over which it passed, and, merely pushing on the

* For a full description of the abrupt gorge of the Tchussovaya, see 'Russia and the Ural Mountains,' vol. i. p. 352 *et seq.*

loose detritus which it meets with, or carries along with it from the sides of the upper mountains, has never excavated the lateral valleys, nor even cleared out their old alluvia. This fact was well noticed by the Swiss naturalists, as evidenced by present operations, at their last meeting in the Upper Engadine, and has been well recorded by that experienced and sagacious observer of glacial phenomena, M. Martins.

Since that time the able French geologist, M. Collomb, who was associated with Agassiz in his earliest researches on glaciêrs, and has been the companion, in Spain, of my colleague M. de Verneuil, has recently put into my hands the results of his own observation upon the present and former agency of the glaciers of the Alps, which decisively show that ice, *per se*, neither has nor has had any excavating power.‡ None of the glaciers of the Alps cited by M. Collomb, viz. those of the Rhone, the Aar, the Valley of Chamounix, the Allée Blanche, and the Valley of Zermatt, produce any excavation in the lower grounds over which they pass. That of Görner, which, among others, is advancing, affects very slightly the surface of the meadows on which it proceeds, and does not penetrate into the soil. Again, where the glacier of the lower Aar pushes, on its front, upon accumulations of the débris of old moraines and gravel, it scarcely deranges these materials, but slides over them, leaving them covered with mud and sand, but not excavating them. Also, the glacier of the Rhone, the principal part of which can be so conveniently studied, advances on a gravelly substratum, in which it does not form a channel. Such being the facts as regards glaciers now advancing, M. Collomb cites equally strong, if not still stronger, cases, in support of his view, as derived from the observation of retiring or shrinking glaciers in the valleys of the Alps. Examining last year with M. Daubrée the glaciers of the Valley of Chamounix, he was attracted to that named Bossons, which he had not seen for five years. During that time the glacier had shrunk very considerably, both in altitude and length, and yet upon the surface of the ground from which it had retired there was not the smallest sign of excavation.

Viewing a glacier as a plastic body, we know that it is pressed onwards by gravitation from the increasing and descending masses

---

† See 'Revue des Deux Mondes,' Mars, 1864. The former observations of M. Martins on Norway and on the Alps are of the highest importance.

‡ I may add that M. Collomb expresses that which I believe to be the opinion of Elie de Beaumont, d'Archiac, de Verneuil, Daubrée, and all the leading French geologists.

of snow and ice behind it in the loftier mountains, and being forced to descend through narrow gorges, it naturally acts with the greater energy on the precipitous rocky flanks of these openings; striating and polishing them with the sand, blocks, and pebbles which it holds in its grasp. But, as before touched upon, the narrowness of many of those channels through which glaciers have been thrust for countless ages, is in itself a demonstration that the ice can have done very little in widening the gorge through which it has been forced, and where, of necessity, it exerted by far its greatest power. In other words, the flanking rocks of each gorge have proved infinitely more stubborn than the ice and its embedded stones, which have merely served as gravers and polishers of the granites, quartz rocks, porphyries, slates, marbles, or other hard rocks, among which the frozen river has descended. And, if such has been the amount of influence of advancing glaciers in the higher regions, where the body descends with the greatest power, how are we to believe that when this creeping mass of ice arrived in low countries (as for instance in the depressions occupied by the Lakes of Geneva and Constance) it could have exerted a power infinitely greater than that which it possessed in the higher regions?

When we turn from modern glaciers to the remains of those of ancient date, the proofs are equally decisive, that, whatever might be their extent, those gigantic bodies exercised no excavating power. I am reminded by M. Collomb, as well as by M. Escher von der Linth, that in many parts of the Alps, vast old moraines repose directly on incoherent and loose materials of quaternary age; the old drift of the Alps, containing *Elephas primigenius* and *Rhinoceros tichorhinus.* Well may we then ask, how is it that the ancient and larger glaciers, which were supposed to have had such enormous excavating power as to have scooped out deep valleys in hard rocks, should not have entirely destroyed the loose accumulation of gravel over which they have been spread? Or, if glaciers excavated the Lago di Garda and Lago Maggiore, why did they not produce any such effect at Ivrea, in the Valley of Aosta, down which we know that enormous masses of ice travelled; or at Rivoli, in their march from Mount Cenis towards Turin?

Leaving it to physical philosophers, such as Forbes, Faraday, Hopkins, and Tyndall, to show what is the real measure of the abrading power of masses of moving ice, I simply form my opinion from what glaciers are accomplishing, or have accomplished. Judging from positive data, I infer that if, as agents, they have been wholly incapable of removing even the old and loose alluvial drift which encumbered the valleys, infinitely less had they the power of excavating hard rocks. At the same time I know that, in every mountain tract which I have examined, there have been quite a sufficient number of rents and denudations to account for all inequalities. These openings have doubtless been greatly increased by the atmospheric agencies of ages, and particularly in all those situations where water has acted with great power, during the melting of glaciers.

I have made these observations (which I could largely extend) to show the intimate connection which exists between the science of geology, to which I have been so long devoted, and physical geography. Let me explain, however, that I do not doubt that glaciers have, in certain regions, caused the formation of lakes, though by a very different agency from that of the excavation of rocks. The great glaciers of former times have unquestionably sent forth and discharged still larger accumulations of débris than those of our day, which, in the form of high terminal moraines, barred up water-channels, and the result in some mountainous tracts has inevitably been the production of lakes. Among examples of such in Europe, M. Collomb directs my attention to the Gérard-meer, on the western flanks of the Vosges mountains. This lake has been formed by an ancient moraine, which, descending from the Vosges mountains, has been accumulated on old drifted loose materials, which it has not excavated, whilst it has served as a permanent dam to sustain the waters at a height of 1400 feet above the plain of the Rhine, to the east of the Vosges, and nearly 2000 English feet above the level of the sea.

In the grand and loftier cases, however, of Western Tibet, before alluded to, it is scarcely conceivable that icy barriers or moraines in the valleys could have risen to sufficient height to pond back the waters to many thousands of feet above the low country on the south. The bursting of those old vast and lofty mountain lakes was probably, as suggested by Dr. Falconer, determined by the last great upheaval of the Himalayas, which, judging from the very modern character of the organic remains in the upheaved deposits, must have taken place during one of the most recent of geological epochs.

In referring you to my observations of last year on the marvellous effects of those aqueous currents which have transported erratic blocks of stone during the former glacial period, I must attract your notice to a remarkable and faithfully executed new map of Finland by

Professor Nils Nördenskiold, of Helsingfors, which illustrates an able memoir by that author on the scratched and polished surfaces of the rocks of his native country.* Carefully taking the direction of every one of the innumerable sets of parallel scratches over a region larger than Great Britain, he shows, that everywhere the direction of these groovings and scratches is from north-west to south-east, with slight local deviations only. Again, the worn sides (stoss-seiten) of each hard rock which has been scratched, worn down, and polished, are presented to the north-west, the point from which the force proceeded; and every *lee*, or protected and rough side, lies to the south-east. On the coast of Finland these groovings are even observed to extend in one place from many feet under the surface of the sea. Seeing that the force which produced these groovings and scratches came from beyond the Gulf of Bothnia and the low country of Sweden, and has operated with such uniformity over a vast region, parts of which rose to about 1000 feet above the Bothnian Gulf, he necessarily refers the phenomena to powerful marine currents. These took place when Finland, as well as all Northern Russia and Germany, lay under the sea, and when the chief groovings were made by stones and blocks, which were held fast in the bottom of floating icebergs, when they were arrested on submarine banks or points of rock. He also indicates how the erratic blocks dropped by these icebergs are found to be more and more rounded as they have receded from the source of their origin, or how, in drifting to the south-east, they have consequently been more exposed to wear and tear. The quantities of sea-sand which abound, and the accompanying small and waterworn pebbles and gravel, have, of course, assisted in the polishing of the rocks. The sand-ridges and pebble-beds which abound in Finland are, in fact, nothing different from the Ösar of the Swedish geologists; and thus the drift phenomena on either side of the Gulf of Bothnia are shown to be identical sub-aqueous deposits.

Here, then, we have a vast region of Europe in which it is manifest that no land-ice or glacier could ever have acted, inasmuch as the area from whence the force was directed was manifestly far to the north-west of the Gulf of Bothnia, and the low countries of Sweden, which, equally with Finland, are covered with erratic blocks and aqueously transported drift. Neither in the south of Sweden nor in Finland are there any moraines, all the detritus

* 'Beitrag zur Kentniss der Schrammen in Finland.' Von N. Nördenskiold. Helsingfors, 1863.

around the great erratics being water-worn; and yet the scratched and polished surfaces, the worn and abrupt sides of the hillocks, in both these countries, resemble precisely the *roches moutonnées* seen in the march of every existing glacier. Agreeing, as I do entirely, with Professor Nördenskiold (for in my published works I have maintained the same view as regards the southern parts of Sweden, and all Northern Russia, Prussia, and Germany),* I also agree with him in the conclusion that the depressions in the surface of Finland, which are now occupied by innumerable lakes, are those which existed when the country was a sea-bottom, and that the present lakes simply occupy the hollows which existed when Finland was raised from beneath the waters. In a table giving the lithological structure of each rock *in situ* which has been grooved, it is shown that the depth of the scratches bears an exact relation to the hardness and resisting nature of the rock. The map—on which every lake and the numerous scratched surfaces are marked, as well as all the altitudes —is a work which must elicit the admiration of every geographer and geologist, and does such honour to Professor Nördenskiold, that our Council has justly placed him in the list of our Honorary Members.

The lines of striation, so carefully laid down by Nördenskiold in Finland, I have myself found extending in the adjacent low regions of Russia, and notably upon the hard quartzose rocks forming the sides of the lake Onega, at a distance of 500 miles from the Bothnian Gulf. There, also, they are seen to be continuous from the shore under the water of the lake, being visible at some feet below the surface. In this flat or slightly undulating country we have all the same proofs as in Finland, that these scratches, groovings, and polishings could only have been produced by stones carried in icebergs; and there, as in Finland, the great erratics, referable to the north-western parts of Norway, have been dropped at numerous intervals, some of them from Lapland, extending to the western flank of the Ural mountains. In the work and map of 'Russia and the Ural Mountains,' published by myself and companions De Verneuil and Keyserling, the enormous area over which these erratics were transported during the period when the glacial sea covered Russia in Europe and Northern Germany was defined. It was then for the first time made manifest that the currents which transported these blocks had eccentric directions. Thus, whilst the blocks in Finland

* See 'Russia in Europe and the Ural Mountains,' vol. i. chapters 20 and 21. Also, 'Quart. Jour. Geol. Soc.,' vol. ii. p. 349.

and Northern Russia had proceeded from N.W. to S.E. (having been derived from the old north Norwegian ice-fields), the blocks which covered the plains of Prussia, and extended over Poland up the great valleys, on to the foot of the Carpathians, being also of Scandinavian origin, must have been brought from north to south when all those lands were under the sea. On the east of England the great Scandinavian erratics came from the west coast of Norway, whilst in Lapland, M. Böhtlingk had shown that the blocks were diverted northwards into the icy sea.

These facts of the divergence of the distribution of the erratics, as due to divergent currents, are quite in harmony with what would be found at the present day, if the bottom of the sea could be so laid bare as to enable us to refer to the various north or south polar glaciers, or to those of Greenland, the devious lines of deposit of the blocks derived from each of these regions, as determined by different prevailing currents.

If we refer to what glaciers have effected upon land, and to those phenomena which could only have been produced when the rocks so affected were submarine, we must admit that two distinct modifications of the same great agency have produced similar results. The great mass of low country in North America, the surface of which has been striated in like manner from north to south, seemed to me long ago to fall into the category of subaqueous striation by floating icebergs, which were here and there arrested in their progress by sunken rocks. When presiding over the Geological Society of London, in 1842, I gave all credit to Mr. Peter Dobson, a citizen of the United States, for the adoption of that view in reference to his native land,—a previous acquaintance with whose writings, I then said, might have saved volumes of disputation on both sides of the Atlantic.* And now, after a lapse of 22 years, I hold to the same belief.

In the admirable work of Sir W. Logan on the 'Geology of Canada,' my eminent friend expresses the opinion, "that the grooves on the surfaces of the rocks which descend under the water appear to point to glacial action as one of the great causes which have produced these depressions."† Not having visited the region myself, I should have no right to oppose my opinion to that of such weighty authority,

* See 'Anniversary Address, Proc. Geol. Soc.,' vol. iii. pp. 686 *et ante.*

† 'Report of Geological Survey of Canada, 1863,' p. 889 and note *ib.* Montreal.

were it not that the grounds assigned for believing in the excavating power of glaciers in North America are the same striations on the sides of the lakes, and beneath the water, as those which I have cited from the shores of the Bothnian Gulf and the lake of Onega in Northern Russia. Now, as regards the latter countries, I have shown that land glaciers could never have passed over them; for surely no terrestrial glacier in advancing to Finland and Northern Russia can have scooped out the Bothnian Gulf by the way! Instead of such striation on the sides of rock-basins, now filled with water, being proofs of the grinding and excavating action of former glaciers, particularly in the cases of Finland and North America, where no lofty mountains, as in the Alps, are at hand to give great power to descending masses of ice, I conceive that such phenomena can only be explained by appealing to the grating action of the bottom of former floating icebergs. My belief is, that the great North American lakes were cavities originally due to a combination of ruptures and denudations of the rocks, and that the whole surface of the lower country thus prepared, was under the sea when icebergs coming from Arctic glaciers floated over it.

We can thus well imagine how countless icebergs were here and there arrested on those submarine rocks which now form the sides of the lakes, and how each icy mass, forced on by a powerful current, after producing the well-known striation on the points of stoppage, would necessarily, when set free, float rapidly across the deep sea cavity, until the base of the iceberg was again arrested by the prominences on the opposite side of the depression, there again to make striations with the stones held fast in its bottom. In this way we can just as easily account for the transport of the numerous great erratics which are spread over North America up to 38° N. latitude, as we have explained the transport of the Scandinavian blocks up to the foot of the Carpathian Mountains.

Whilst, therefore, I fully recognise the stupendous spread and influence of former land-glaciers over extensive regions, I at the same time affirm, that as regards the striation and polishing, the worn side and the abrupt side of the rocks affected, floating icebergs, when impeded by submarine obstacles, have also produced those results. The true and independent test of the action of terrestrial glaciers is the existence of moraines. Now, there is no trace of these peculiar accumulations in the South of Sweden and Finland, all the detritus of those regions, as well as of the North of Russia and Germany, being waterworn; and I have yet to learn that there are any evidences of true moraines in the low countries of Canada and the United States.*

P.S.—Whilst I was reading this Address to the Geographers in London, that sound practical geologist, Principal Dawson, was performing a similar duty at the Annual Meeting of the Natural History Society of Montreal. Having received a copy of his Address in time for insertion of a Postscript, I am glad to have the opportunity of stating that he also is a vigorous opponent of the theory which refers the striation of the North American rocks, and the excavation of the great lake basins of that country, to the action of terrestrial glaciers. He shows indeed that the great striation of a large portion of the continent from N. E. to S. W. was from the ocean to the interior, against the slope of the St. Lawrence valley, thus disposing at once of the glacier theory; for it is impossible to imagine that a glacier travelled from the Atlantic up into the interior. Admitting that in limited tracts of Eastern America there may have been local glaciers, Mr. Dawson believes, as I do, that the rocks of the chief countries in question were striated when the land lay beneath the sea.

Africa.

North-western Africa.—Senegal and its Dependencies.—Looking to the well-digested and clear accounts of the progress of geographical research in Northern or North-western Africa, which have been embodied in the Reports of the Geographical Society of France, by M. Malte Brun, I have only to refer you to those works, and not detain you on this subject by any observations of my own. I am, however, impelled to call your notice to a work of this year 1864, the 'Annuaire de Sénégal,'† as followed by a *résumé* of the explo-

* For a full explanation of my views respecting the manner in which former floating icebergs transported blocks, and spread out submarine detritus, I must refer the reader to the 21st and 22nd chapters of the work 'Russia and the Ural Mountains,' pp. 507 to 556. Since that time (1845) I have indeed seen reason to admit a much greater extension of former land-glaciers than my colleagues and myself then believed in, and this I explained in my last Address to the Royal Geographical Society.

† Printed at St. Louis, Senegal, 1864. Paris, chez Challamel aîné, Rue des Boulangers, 30.

rations of the interior, made by order of the Government, in the years 1859, 1860, and 1861, and which has just fallen into my hands. Whenever our allies the French describe any one of their possessions, it is invariably done with method, order, and a lucid condensation of details; and such qualities are particularly observable in this little volume. Discovered in 1460 by some bold navigators of Dieppe, Senegal was soon after colonised by the same Normans. In succeeding centuries the Portuguese and Dutch warred for the occupation of these tracts, until 1758, when the English took the country, including Goree, but ceded it again to France by treaty. Again, in 1800, Goree fell into our hands, and in 1809 we added to it St. Louis; but, at the conclusion of the last great war in 1814, the whole territory was rightly given back to France, its original occupant. Holding possession of this territory for the last fifty years, the French have striven energetically to improve it, by a vast enlargement of boundary, the construction of forts, strict military tenure, and by carrying on a commerce with the adjoining native tribes; so that they reckon upon having 200,000 subjects, and, after several years of war, they are now in relation with about a million of natives.

In the long list of annexations of native districts, it is gratifying to read, as a sequence of the last treaty of peace, that a telegraphic communication is now established between St. Louis and Goree, and that in 1863 the new port of Dakar was formed. Recently the quiet state of the political horizon has enabled the Governor, Colonel Faidherbe, who has been the mainspring of French progress in Senegal, and who has recently been named one of our Honorary Foreign Members, to send various exploratory parties along the north coast and into the interior of the country. These have added much important information to the sketches of tracts formerly visited by the Père Labat, Mungo Park, Caillé, Mollien, and Panet. The French colonists, since their occupation of Algeria, have sagaciously sought for original knowledge in the native recitals of Arabs, and the inhabitants of Soudan and Berber. With these data, and in acquiring the language of the natives, several travellers,—such as Captain Vincent; MM. Bournel and Mage, young Naval officers; Pascal and Lambert, Infantry officers; with Alioun Sal and Bough-el-Moghdad, intelligent Native officers in the French service,—have, in the years 1859, 1860, and 1864, made most successful journeys. Thus, the portion of Soudan adjacent to Senegal is now nearly as well known as the more central regions, which have been already developed by British explorations, including those of Denham, Clapperton, and W. Lander,* and the works of our honoured Associate Barth. One of these parties, Alioun Sal, reached Timbuctoo; and the death of this young and intelligent Mohammedan, who unfortunately fell a prey to the fever of the country, has been deeply lamented by the authorities of Senegal.

Before quitting the subject of North-western Africa, I am unwilling to pass unnoticed the services of the enterprising young German traveller Gerhard Rohlfs, who, having made a successful journey through Southern Morocco by Tafilet to Gerysville in Algeria, is now on his route to Timbuctu under the auspices of the Royal Geographical Society.

Northern Abyssinia.—The efforts of our German contemporaries to complete our acquaintance with Northern Abyssinia and the adjacent countries (of which mention was made in a note to my last year's Address), have been most successful; and every geographer must have heartily commended the researches of Von Heuglin, Kinzelbach, Munzinger, and Steudner. Whilst these travellers have prepared an excellent detailed map of the districts of Bogos, Manesa, and Murea, with the surrounding tracts, a more extended map, ranging from the Red Sea on the east to 34° 45′ E. longitude, which has resulted from their surveys, is a work of great and general interest. For, in it, we find the routes laid down of all the travellers of various countries during the last quarter of a century, who have examined the regions between Massáwa and the coast of the Red Sea on the east, and the river Atbara, that great affluent of the Nile, on the west. This sheet, as published in the 'Mittheilungen' of Petermann, is an excellent example of the amount of knowledge which can be conveyed on a map alone; the successive journeys of the different travellers being laid down in different colours with border profiles showing the relative heights of the different countries traversed.

* I have just had the gratification to learn that, with a due appreciation of the devoted and zealous researches in Central Africa of that accomplished young traveller Edward Vogel, who was barbarously beheaded by the King of Wadai, Earl Russell has granted the sum of 500*l.* to Miss Julia Vogel, the sister of the deceased. In thanking me warmly for supporting her cause, this lady assures me that, by this generous act, all her prospects in life are brightened, and that her heart's desire will now be fulfilled in being enabled to do honour to the memory of her lamented brother, as well as, she says, "to assist a younger brother in those studies which may enable him to serve a country to which she will ever cling with the deepest gratitude."—24 June, R. I. M.

The Niger.—The last accounts I have seen of the labours of Dr. Baikie are contained in a private letter to a relative, dated at Lukoja, on the 9th October, 1863. This persevering and praiseworthy envoy of our Government, who has been seven years in Africa and in whose appointment I took much interest, had, it appears, made up his mind to come home last year, when he received instructions to remain at his post till further orders.* In braving the dangers of the climate, Dr. Baikie has shown how a British settlement can be made a centre of civilization. Alone, and almost without means, he has contracted friendships with all the leading chiefs of Soudan, and has awed tribes merely by the exercise of moral influence, whilst his messengers can now travel securely from his station to Bonny.

It is by such an example and such persevering conduct that Africa can be best civilized; and we must earnestly hope that whoever may succeed Dr. Baikie, will follow the same kind, judicious, and forbearing conduct which has endeared him to the natives, and has enabled him to make his little station, so far up the Niger, a centre of commerce and friendly intercourse with them.

The Gaboon Country.—Although the progress of the recent expedition of M. du Chaillu to the scene of his former explorations has been unluckily checked by the loss of his scientific instruments, I trust that when he receives the fresh supply sent out to him by us, he will make a successful examination of the interior in those latitudes. He has, indeed, already sent home instruments, including the native harp with strings of vegetable fibre, which prove the truthfulness of some of his descriptions which had been unjustly discredited. As regards his previous accounts of the geography of the Gaboon country, M. du Chaillu's accuracy, in the main, has been amply confirmed by Lieuts. Serval and Du Bellay, who have since made surveys in the interior.†

South Africa.—Explorations of the Baron C. von der Decken.—The unchanged terrestrial condition of the ancient Surface of the Interior of South Africa.—Project of rendering the White Nile the highway of intercourse between Central Africa and Europe.—Petherick's Journal.—Whilst our last Session closed with the striking results of the journey of Speke and Grant, and our warm welcome of the undaunted travellers, who, for

* As this Address is printing, Mr. Layard informs me that the *Investigator* steamer has been ordered to bring Dr. Baikie down the Niger, and that he may be expected home this year.

† Vide Petermann's 'Mittheilungen,' December, 1863. Messrs. Serval and Du Bellay have explored the little-known river, the Ogowai, which flows from the interior, about 20 leagues to the south of the Gaboon.

the first time in history, had crossed Equatorial Africa and had also descended along the course of the great White Nile from its water-basin to its mouth, the opening of this Session was marked by the interesting and detailed description of the snow-clad mountain Kilima-ndjaro, the issue of two expeditions conducted entirely at his own cost by Baron C. von der Decken.

In the first of these, he was accompanied by my clever and lamented young friend, the late Mr. Richard Thornton, who drew the first contoured map of that wild and lofty country, took many observations of latitude and longitude, and kept an accurate diary. Copies of all his writings, as well as his original map, have now been sent by his family to the Royal Geographical Society.* In the second expedition, Baron von der Decken had for his scientific companion a German astronomer, Dr. Kärsten.

I have already adverted at some length to the importance of this enterprise, as recorded in our 'Proceedings,' and also in the award of the Medal. I have informed you that, in reference to the prosecution of other enterprises by the same distinguished person, the First Lord of the Admiralty had given directions that Her Majesty's vessels on the coast of Africa should assist the Baron in passing his own steamer into one of the rivers of Formosa Bay; and I have now to state that Her Majesty's Secretary for Foreign Affairs has strongly recommended this enterprising traveller to the good-will of the Sultan of Zanzibar, through the British Consul at that place. Seeing that Baron von der Decken, who has already done so much, is organising at considerable expense another expedition, in which, providing himself with an iron river-steamer, he will be attended by competent observers, we naturally wish him all the success which his zeal and devotion to our cause merit.

If, after ascending one of the rivers which fall into the Bay of Formosa, he should reach Mount Kenia or any part of that mountainous region of Eastern Africa, north of the Kilima-ndjaro, probably a great watershed, and should thence descend by any eastern affluent of the White Nile, or should reach Egypt by the Blue Nile, in either case he will have performed a most essential service to geography. In the mean time, both for the great and good duties he has already performed, and for the extensive and vigorous preparations he is now making to enlarge our acquaintance with the geography of Africa, the Council has in my opinion wisely adjudicated a Gold Medal to Baron C. von der Decken.

---

* See my observations on the late Richard Thornton in the Obituary, p. cxxiii.

Our Victoria Medal has, with great propriety, been awarded to the gallant Captain Grant,* the companion of Speke, to mark, as I have said, emphatically and once more, our sense of the vast importance of their journey across Equatorial Eastern Africa, and the region of the head waters of the Nile. By their researches the watershed between North and South Africa was first established in respect to the Eastern Equatorial region. The results which ought to follow from these discoveries will be further considered in the sequel.

In former Addresses I suggested that the interior mass and central portions of Africa constituting a great plateau occupied by lakes and marshes, from which the waters escaped by cracks or depressions in the subtending older rocks, had been in that condition during an enormously long period. I have recently been enabled, through the apposite discovery of Dr. Kirk, the companion of Livingstone, not only to fortify my conjecture of 1852, but greatly to extend the inferences concerning the long period of time during which the central parts of Africa have remained in their present condition, save their degradation by ordinary atmospheric agencies. My view, as given to this Society in 1852, was mainly founded on the original and admirable geological researches of Mr. Bain in the colony of the Cape of Good Hope. It was, that, inasmuch as in the secondary or mesozoic age of geologists, the northern interior of that country was occupied by great lakes and marshes, as proved by the fossil reptile discovered by Bain, and named Dicynodon by Owen, such it has remained for countless ages, even up to the present day. The succeeding journeys into the interior, of Livingstone, Thornton, and Kirk, Burton and Speke, and Speke and Grant, have all tended to strengthen me in the belief that Southern Africa has not undergone any of those great submarine depressions which have so largely affected Europe, Asia, and America, during the secondary, tertiary, and *quasi* modern periods.

The discovery of Dr. Kirk has confirmed my conclusion. On the banks of an affluent of the Zambesi, that gentleman collected certain bones, apparently carried down in watery drifts from inland positions, which remains have been so fossilized as to have all the appearance of antiquity which fossils of a tertiary or older age usually present. One of these is a portion of the vertebral column and sacrum of a buffalo, undistinguishable from that of the Cape buffalo; another is a fragment of a crocodile, and another of a

* See 'Presentation of Royal Awards,' *ante*.

water-tortoise, both undistinguishable from the forms of those animals now living. Together with these, Dr. Kirk found numerous bones of antelopes and other animals, which, though in a fossil condition, all belonged, as he assured me, to species now living in South Africa.

On the other hand, none of our explorers, including M. Bain, who has diligently worked as a geologist, have detected in the interior any limestones containing marine fossil remains, which would have proved that South Africa had, like other regions, been depressed into oceanic conditions, and re-elevated. On the contrary, in addition to old granitic and other igneous rocks, all explorers find only either innumerable undulations of sandstones, schistose, and quartzose rocks, or such tufaceous and ferruginous deposits as would naturally occur in countries long occupied by lakes and exuberant jungles, separated from each other by sandy hills,—scarcely any other calcareous rocks being found except tufas formed by the deposition of land-springs. It is true that there are marine tertiary formations on the coasts (around the Cape Colony, near the mouth of the Zambesi opposite Mozambique, and again on the coasts of Mombas opposite Zanzibar), and that these have been raised up into low-coast ranges, followed by rocks of igneous origin. But in penetrating into the true interior, the traveller takes a final leave of all such formations; and in advancing to the heart of the continent, he traverses a vast region which, to all appearance, has ever been under terrestrial and lacustrine conditions only. Judging, indeed, from all the evidences as yet collected, the interior of South Africa has remained in that condition since the period of the secondary rocks of geologists! Yet, whilst none of our countrymen found any evidences of old marine remains, Captain Speke brought from one of the ridges which lay between the coast and the lake Victoria Nyanza a fossil shell, which, though larger in size, is undistinguishable from the *Achatina perdix* now flourishing in South Africa. Again, whilst Bain found fossil plants in his reptiliferous strata north of the Cape, and Livingstone and Thornton discovered coal in sandstone, with fossil plants, like those of our old coal of Europe and America,—yet both these mesozoic and palæozoic remains are terrestrial, and are not associated with marine limestones, indicative of those oscillations of the land which are so common in other countries.

It is further to be observed that the surface of this vast interior is entirely exempt from the coarse superficial drift that encumbers so many countries, as derived from lofty mountain-chains from which either glaciers or great torrential streams have descended. In this respect it is also equally unlike those plains of Germany, Poland, and Northern Russia, which were sea-bottoms when floating icebergs melted and dropped the loads of stone which they were transporting from Scandinavia and Lapland.

In truth, therefore, the inner portion of Southern Africa is, in this respect, as far as I know, geologically unique in the long conservation of ancient terrestrial conditions. This inference is further supported by the concomitant absence, throughout the larger portion of all this vast area, *i.e.* south of the Equator, of any of those volcanic rocks which are so often associated with oscillations of the *terra firma*.*

With the exception of the true volcanic hills of the Cameroons recently described by Burton, on the west coast, a little to the north of the Equator, and which possibly may advance southwards towards the Gaboon country, nothing is known of the presence of any similar foci of sub-aërial eruption all round the coasts of Africa south of the Equator. If the elements for the production of them had existed, the coast-line is precisely that on which we should expect to find such volcanic vents, if we judge by the analogy of all volcanic regions where the habitual igneous eruptions are not distant from the sea or from great internal masses of water. The absence, then, both on the coasts and in the interior, of any eruptive rocks which can have been thrown up under the atmosphere since the period when the tertiary rocks began to be accumulated, is in concurrence with all the physical data as yet got together. These demonstrate that, although the geologist finds here none of those characters of lithological structure and curiously diversified organic remains, which enable him to fix the epochs of succession in the crust of the earth in other quarters of the globe, the interior of South Africa is unquestionably a grand type of a region which has preserved its ancient terrestrial conditions during a very long period, unaffected by any changes except those which are dependent on atmospheric and meteoric influences.

If, then, the lower animals and plants of this vast country have gone on unchanged for a very long period, may we infer that its human inhabitants are of like antiquity? If so, the Negro may claim as old a lineage as the Caucasian or Mongolian races. In the absence of any decisive fact, I forbear at present to speculate on

* Although Kilima-ndjaro is to a great extent igneous and volcanic, there is nothing to prove that it has been in activity during the historic era.

this point; but as, amid the fossil specimens procured by Livingstone and Kirk, there are fragments of pottery made by human hands, we must wait until some zealous explorer of Southern Africa shall distinctly bring forward proofs that the manufactured articles are of the same age as the fossil bones. In other words, we still require from Africa the same proofs of the existence of links which bind together the sciences of Geology and Archæology which have recently been developed in Europe. Now, if the unquestioned works of man should be found to be coeval with the remains of fossilized existing animals in Southern Africa, the travelled geographer, who has convinced himself of the ancient condition of its surface, must admit, however unwillingly, that although the black man is of such very remote antiquity, he has been very stationary in civilization and in attaining the arts of life, if he be compared with the Caucasian, the Mongolian, the Red Indian of America, or even with the aborigines of Polynesia.*

The discovery of that vast water-basin, the Victoria Nyanza, in the heart of Equatorial Africa, and the proof that a great stream flowed out from its northern extremity, which Speke and Grant followed, and showed almost conclusively to be the White Nile, was truly, as I said last year, a grand feat, of which all our countrymen had reason to be proud. But, in warmly praising and honouring the men who accomplished it, we are not yet satisfied, as geographers, with this their single line of march, and the valuable data which they fixed. We look naturally to other efforts which must be made to dispel scepticism regarding the upper waters of the Nile, including that raised by the claim of the Venetian traveller Miani, as to his having continuously ascended a river to $2\frac{1}{2}°$ to the s.s.w. of Gondokoro, the rocky banks of which he has laid upon a sketch-map, and which he contends does not flow from the Victoria Nyanza. But irrespective of such a claim, the Council of our Society have, on general grounds, come to the conclusion that the physical geography of all the region, together with the shores of the Victoria Nyanza (a lake laid down by Speke as larger than Scotland), should be further explored, and the nature and extent of the various affluents of that vast body of water determined. They further wish to see examined the region lying between the great lake Luta-Nzige, north of the Equator, and the lake Tanganyika, south of it, in order to deter-

* The most remarkable proof of the inferiority of the negro, when compared with the Asiatic, is, that whilst the latter has domesticated the elephant for ages and rendered it highly useful to man, the negro has only slaughtered the animal to obtain food or ivory.

mine if there be not there (as some geographers think possible) other sources of supply for the White Nile, coming from the region to the west of the Victoria Nyanza; and finally, that, if possible, the Upper White Nile of Speke and Grant should be traced continuously from the lake to that point, where, according to their map, it is made to join the end of the lake Luta-Nzige.

Having considered this subject, the Council has adopted my proposal, to assist in fitting out an expedition to clear away all such obscurities, by ascending the White Nile, and not, as previously, by any efforts from Zanzibar and the eastern coast of Africa. The difficulties encountered by Speke and Grant in passing through that tract, and the apparent impossibility of establishing any regular traffic between the east coast and the central kingdoms, have induced us to prefer to any other line of research an effort to render the Great White Nile a channel of intercourse and commerce between the prolific interior and the traders of the Mediterranean Sea. One serious difficulty only exists in bringing about this desirable consummation. Between Khartûm, the present southern boundary of Egypt, and Gondokoro no obstacle on the river-navigation exists, as recently proved, indeed, by the voyage of the enterprising and intelligent Dutch ladies, though the natives in the interior have, it appears, been to a great extent demoralised by the conduct of the traders in ivory, who, arming one set of villagers against another, are said to plunder tribes, and carry away the women and children as slaves. Now, these horrible practices having been still more ruthlessly carried into effect above or south of Gondokoro, as we learn from the testimony of Speke and Grant, a belt of country, from 100 to 200 miles in breadth, inhabited by the Bari, has been rendered so lawless and savage, that it was with the utmost difficulty our medallists traversed it in their way northwards from the fertile kingdoms of Karagwe, Uganda, and Unyoro.

On the part of the Society, therefore, the Council have drawn up a memorandum, in which, after enumerating the desiderata, commercial, philanthropical, and geographical, involved in our project, we express the hope, that, as we are ready to embark 1000*l.* in such an expedition, some means may be found to put a stop to this demoralising trade in slaves, which, as our Consul-General in Cairo, Mr. Colquhoun, writes to me, is accompanied by horrors of which no one can form an idea. We believe that this can best be accomplished by the exertions of the Pasha of Egypt, and by the extension of his influence southwards from Khartûm to Gondokoro. The intermediate country is a sort of No-man's-land, in which numerous warring small tribes are kept in an excited and barbarous state by an extensive importation of firearms. Now, if the miserable natives were rescued from disorders occasioned by such enormities, legitimate commerce would eventually arise between the Equatorial kings and the merchants of Cairo and the Mediterranean; and the Great Nile, which for thousands of years has alone served to enrich the soil of Lower Egypt, would eventually become a highway of intercourse with Europe, which might largely tend to the civilisation of Central Africa. To have made the first proposal in a matter of such permanent interest will, I trust, be always counted a proof of the lofty as well as useful efforts of this Society, to bring about a state of things which will prove the real importance of the discovery recently made in Inner Africa by British geographers, and may render the White Nile, for the first time in history, of real use to commerce and civilisation.

The practical geographer will, I trust, find in the observations made by Mr. Petherick and his associate, Dr. Murie, which have at length reached the Society, some materials for the construction of improved maps of the large region on that portion of the west bank of the White Nile which is watered by the Bahr-el-Ghazal. We are also indebted to Mr. Petherick for a measurement of the comparative volume of water discharged by the Nile and its affluents, the Bahr-el-Ghazal and the Sobat. When measurements such as these shall have been repeated at different periods of the year, we shall be in a far better position to estimate the relative importance of the tributaries and parent stream of the Nile.

In the commencement of this Session I adverted to a feeling letter written to me by Mrs. Petherick, the wife of the traveller, and explaining how he had been cast down by misfortunes and severe illness, and was unable then to send home the accounts of his expedition. These documents having arrived, will soon be printed and circulated among the Fellows, who, seeing the amount of work accomplished by Mr. Petherick, will be able to estimate to what extent the disasters he encountered prevented his fulfilling the engagements he had entered into with the view of succouring Speke and Grant.

We now wait with deep anxiety for accounts of the ultimate issue of the journey made by the adventurous Dutch ladies and their scientific companion Baron von Heuglin, and their exploration of the great western affluents of the White Nile.* We are also equally anxious to have some account of the travels of that undaunted, generous, and self-sacrificing explorer, Mr. Samuel Baker, of whom we have heard no tidings for a year.

Conclusion.—In terminating these observations on the results of geographical explorations in various countries, I must, on the grand subject of African geography, as on the previous occasion, decline to enter upon an analysis of the respective writings, of great value in critical geography, which have in past years been contributed by our own countrymen, by continental writers, as well as by the Portuguese authorities who preceded them. An analytical sketch, which would do justice to the scholars who have from time to time set forth the results of their researches, is much wanted. In this way, for example, we might trace the amount and increase of information published by Cooley, first anonymously, in articles of the 'Edinburgh Review,' commencing in 1835, and followed up by him in the construction of a map delineating his view of a line of lakes and rivers proceeding from N.N.W. to S.S.E. through Southern Africa.

In like manner I have not, in anything I said last year, done the justice I wished to our Abyssinian Medallist, Dr. Beke, for his ingenious suggestion as to the region wherein the head-waters of the Nile would be found, and his bold hypothesis, of 1848, respecting the mountain-chains of Africa, which opened out an original view of the physical geography of Africa north of the Equator. The analyses of such subjects as these, and of all the labours of Macqueen, Arrowsmith, Petermann,† and other practical geographers, require much more time and power of research than I possess. Unable to cope with them myself, I hoped that, in taking leave of you at this Anniversary, I might be succeeded by one whose scholarship and powers as a comparative geographer would enable him to describe the

* Since this Address was read, I learn with deep sorrow that Madame Tinné and two of her European attendants have died. Her enterprising daughter, Baron von Heuglin, and Baron D'Ablaing, had, however, reached Khartûm. As Baron von Heuglin is in regular correspondence with M. Petermann, we may look to the 'Mittheilungen' of our correspondent for much interesting matter respecting the exploration of the region of the Bahr-el-Ghazal. In a letter to Capt. Speke, which I have read, Baron von Heuglin speaks of the ivory and slave dealing merchants, and, in addition to much important knowledge respecting the fauna and flora of the Bahr-el-Ghazal, informs us that he has prepared a map of that region, as also of the country of Nyam Nyam.

† The various researches of late years in Africa are admirably illustrated by the series of maps and accompanying descriptions in the 'Mittheilungen' of Petermann, of which I gave an account in my last year's Address, and which have since been completed.

successive steps made by all contributors to our science, and, by a comparison of their labours with those of their predecessors, to trace down throughout the long current of ages the additions which have been made, in Asiatic as well as African geography, by various men, to that vast emporium of geographical knowledge which we now enjoy.

As on this head, doubtless, there have been many omissions on my part, I beseech my friends to be assured that such omissions have not been caused by any want of good will, but simply from an inability to do justice to the theme amidst the many other avocations which occupy my time.*

One task, however, I will try to accomplish, to the best of my ability, if my tenure of life be prolonged, and that you should place me for the current year in this Chair. I will endeavour at our next Anniversary to draw a parallel between the general state of geography when this Society was founded, in 1830, and the condition which it has reached in the present day; and, in doing this, I hope to demonstrate that my countrymen have borne no small share in this progress, and that the Royal Geographical Society has taken the lead in efficiently promoting this great work of advancement,—not merely by the publication of the volumes of our Journal and our Proceedings, but by zealously encouraging explorations, and by rewarding those persons, to whatever nation they belonged, who have thrown light on the geography of the world.

P.S.—Whilst this Address is going through the press, letters from Dr. Livingstone have reached me, giving an account of his journey into the interior, on the west bank of the Shiré, and for nearly 700 English miles to the N.N.W. of that river. Owing to his being obliged to return to settle the affairs of his Consulate and to convey H.M. steamer *Pioneer* down the Zambesi, he was unable personally to determine the question whether any waters flow into the head of the great Lake Nyassa (coming, as had been suggested, from Lake Tanganyika).† The natives, however, one and all, denied that any waters entered the lake from the north, and Livingstone seems

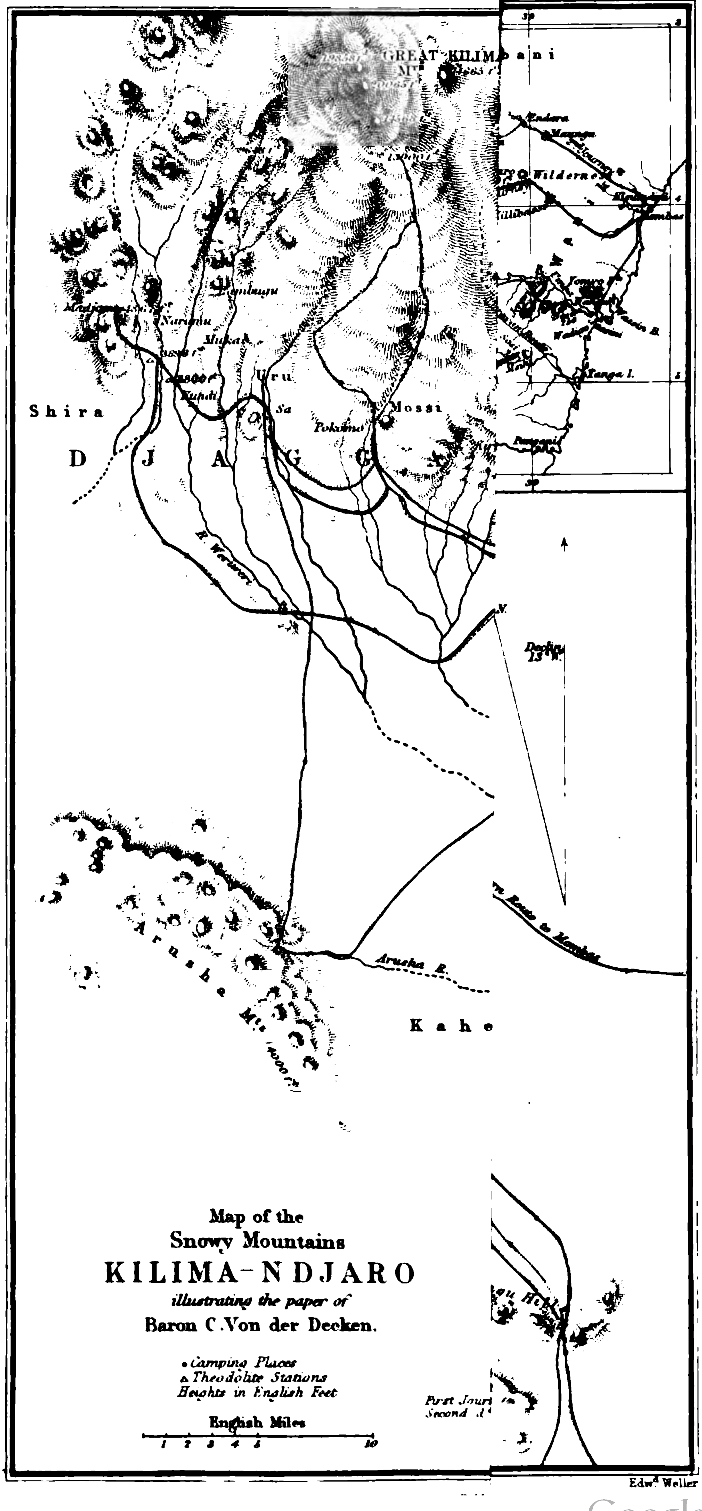
* Some of the discussions which have been going on between Mr. Cooley and Capt. Burton, and others, can only be correctly understood by etymologists who have studied the African languages and dialects.

† As far as it was examined and laid down on a map by Dr. Kirk, the Lake Nyassa trends due South and North.

to think that the lateral affluents which he saw are sufficient to account for the infilling of the lake and the supply of the Shiré.

The one point on which Livingstone and all African travellers are agreed is, that where no traders in slaves and ivory are met with, there no difficulty occurs in passing through the country; the inhabitants willingly serving as porters. In a recent letter to Captain Speke, which I have already mentioned, Baron von Heuglin, after affirming that the ivory dealers in the Bahr-el-Ghazal are barbarising all that fine region, and have rendered it impassable, exclaims that it is a disgrace to civilised governments not to endeavour to put an end to these horrors. Let us hope that the aspirations of our Council, in unison with the prayers of all travellers, may have a due influence on the governments of Europe and Egypt, and thus eventually render the White Nile useful as a highway of commerce.

June 10th, 1864.


Map of the
Snowy Mountains
KILIMA-NDJARO
illustrating the paper of
Baron C. Von der Decken.
• Camping Places
▵ Theodolite Stations
Heights in English Feet
English Miles
1 2 3 4 5 10
Shira
D J A G G A
Uru
Mossi
Pokuma
Kundi
Narumu
Sa
R. Weriweri
Arusha R.
Kahe
Yanga I.
Declin 13° W.
First Journey

Edwd. Weller

PAPERS READ

BEFORE THE

ROYAL GEOGRAPHICAL SOCIETY

DURING THE SESSION 1863–64.

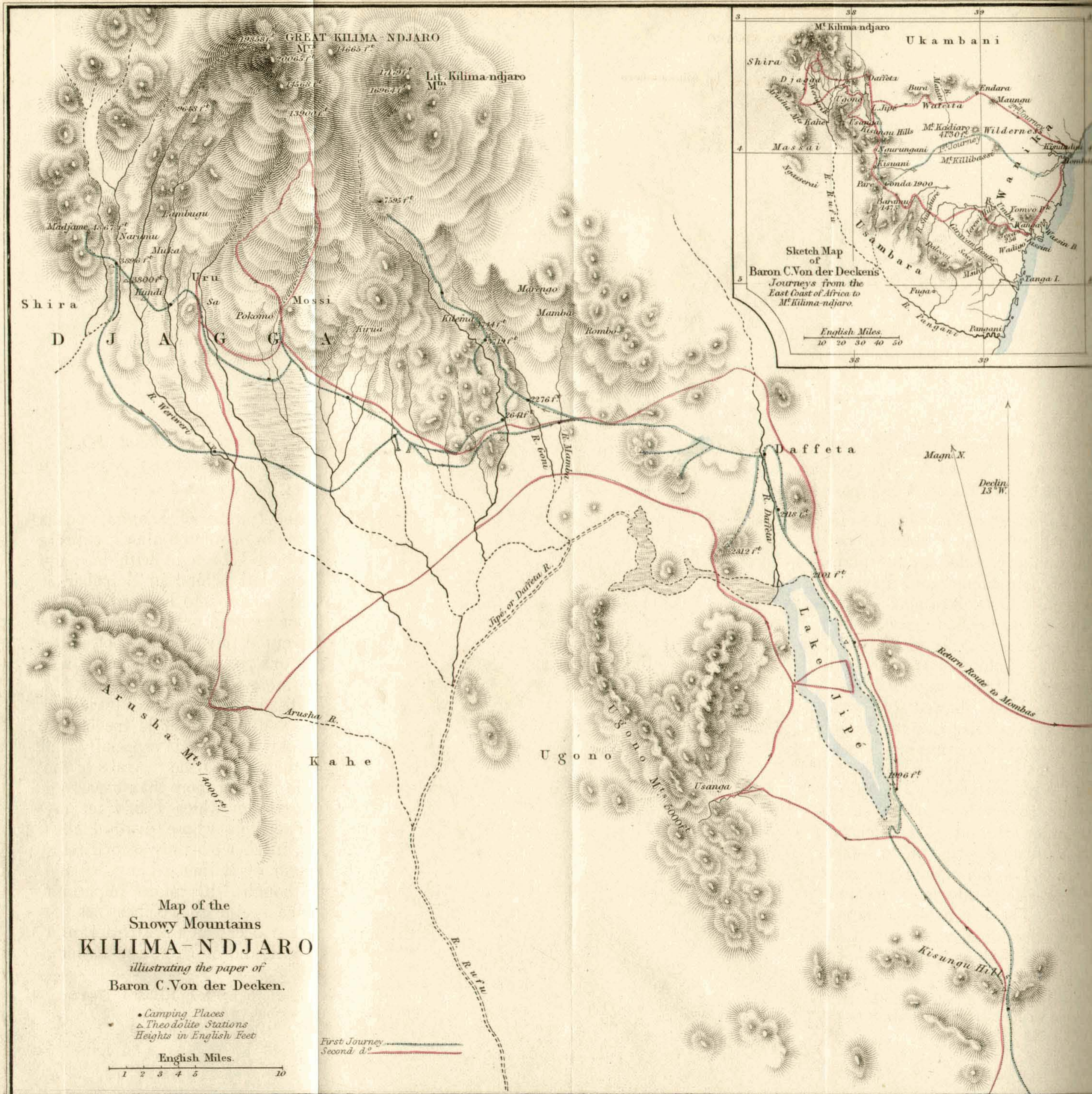
[FORMING VOL. XXXIV. OF THE SOCIETY'S JOURNAL.
PUBLISHED MAY 22ND, 1865.]

I.—*Geographical Notes of an Expedition to Mount Kilima-ndjaro in* 1862-63. By the BARON CHARLES VON DER DECKEN, Honorary Corresponding Member R.G.S.

THE following account of the elevated country of Djagga, and its principal mountain Kilima-ndjaro, has been written almost entirely from memory, aided by the map* which I brought with me; my journals and memoranda having been left behind in Zanzibar, it being my intention to make a second journey into Eastern Africa.

I pass over my first unsuccessful journey from Kilua, in November and December, 1860, when I endeavoured to reach the spot, in the vicinity of Lake Nyassa, where the unfortunate Dr. Röscher was murdered. There was but little of interest in that expedition, but it pretty plainly showed with what disadvantage an inexperienced European traveller has to struggle, and how great is the hatred and contempt entertained for white men, and especially for Christians by the Negroes, who are there called the "Arabs of the coast." In like manner I refrain from making more than a passing allusion to my first journey to Djagga (in which I had for my companion the late Mr. Richard Thornton, whose death I have more and more occasion to lament), inasmuch as my second tour, in which I again visited the mountain of Kilima-ndjaro, led me over precisely the same ground, though with more important results. The last-named circumstance is due to the fact that the instruments I had with me on the last occasion were better, and that Dr. Kärsten, a pupil of the well-known Professor Erman,

* The map was drawn from the orignal sketch by Mr. Richard Thornton, corrected from observations made during the second visit.



Map of the
Snowy Mountains
KILIMA-NDJARO
illustrating the paper of
Baron C. Von der Decken.

Published for the Journal of the Royal Geographical Society by J. Murray, Albemarle Street, London. 1864.

Edwd. Weller

who then accompanied me, was a trained astronomical observer, and in that respect superior to Mr. Thornton and myself.*

On the 3rd of October, 1862, Dr. Kärsten and I, in company with two other Europeans, set out from Mombas. The caravan consisted of 110 men, which number was afterwards increased by a party of 32 elephant-hunters, whom I met with in the interior, and took into my service. I had in addition a large train of asses for transport of the sick, and four dogs for sporting purposes.

I proceeded first along the coast as far as the little port of Wanga, in 4° 45′ south latitude, and 39° 20′ east longitude. I knew my way thence as far as Lake Jipé, this being part of my former route; and I adopted it both because I wished to be independent of a guide, and because there was water to be had along it almost every day, despite the advanced season. On the sixth day out from Wanga, I reached Baramu in the northern part of Usambara, having for five days together continued to ascend along the banks of the river Umba. Here we halted for two days, and, after another five days' journey, reached the extreme south point of Lake Jipé in 3° 42′ 52″ south, leaving the Paré Range to the southward, and taking a path over a saddle-like depression in the Kisungu hills. Baramu is about 1475 English feet above the level of the sea; the foot of the Paré range about 1900 feet, and Lake Jipé from 1969 to 2101 English feet. On travelling inland the ascent is very abrupt to a plateau or table-land, which afterwards rises very gradually. The soil is tolerably uniform, with thinly-wooded land alternating with several steppe-like plains. The prevailing trees are the mimosa, the acacia, the African oak, ebony, baobab, tamarind, and a species of plane-tree. The herbage is thin, and euphorbiæ and cacti are in great abundance. The mineral specimens which I collected here consisted of micaceous slate (which formation extends as far as Baramu), and the same rock with injected lumps of garnet, and with irregular roughened corners, and occasional felspar, which occurred at Paré,—the nodules of garnet in these latter were often two inches in diameter. Between Paré and Lake Jipé the formation is lime-

* The following is a list of the instruments we took with us:—1 Theodolite (by Piston and Martins); 1 Sextant (Dollond); 1 Equatorial Circle (Piston and Martins); 1 Apparatus for measuring magnetic intensity (Meyerstein); 2 Barometers (1 Negretti and Zambra); Maximum Thermometers (Casella and others); Azimuth Compasses; Thermometers (various); Chronometers (Tiede, Hant, Barraud, and others); 1 Telescope (Steinhofer).

Observations for *latitude* were obtained from meridian altitudes of the sun and stars; the longitude was deduced from lunar distances, moon culminating stars, and by chronometric measurements; several positions were determined by triangulation with the theodolite and compass bearing, the *variation* of the compass being carefully observed. The measurements of height were determined by the barometer and boiling-point hypsometer; the regular magnetic and meteorological observations were also taken.

stone, occasionally silicoous. This may prove eventually to be a fresh-water formation.

During my explorations in the previous year, I had only visited the eastern shore of the lake, but on the present occasion I determined to pass to its western side, and at the same time ascend the Ugono Range, in order to ascertain how the iron there existing is worked. These mountains are not above 5800 feet high, but I did not ascend to the top, the highest point I reached being 3975 feet. The Ugono tribe supply almost the entire adjacent country with iron, which they procure by smelting, in large holes, a kind of sand strongly impregnated with the metal, which they find in the streams. It is extraordinary how they are able, with their rude smelting apparatus and primitive tools, to turn out such neatly-fashioned weapons and utensils of all sorts.

I here first had to use my boat, made of iron and gutta-percha, which I had brought from the coast, and in which I now embarked upon the lake. Every furlong or so I caused soundings to be taken, which gave a maximum depth of 17 feet. The surface of the lake was in constant agitation, caused by the movements of hippopotami, crocodiles (some 19 feet long), and fresh-water turtle. The bottom is almost everywhere sandy, with little or no mud. There are but few shells, and those of very minute size.

I spent a couple of days on the lake, enjoying good sport, and then directed my steps to its outlet, passing to the north-eastward of the Arusha hills. The river Daffeta, which rises in the mountains of Djagga, empties itself into the lake, after which it forms almost a right angle, and, where it passes out, takes the name of the River Jipé, which a little lower down changes to Rufu, and still lower down to Pangani, under which designation it falls into the ocean at the little town of the same name.

Another three days' march brought me to the Arusha Mountains, which barely exceed 4000 feet in height. Of a certain Lake Arusha, which is delineated on many maps, I could not find the slightest trace. In the rainy season the river Arusha may possibly overflow here and there, and thus have given rise to the notion of there being a lake.

W.S.W. of our encampment and about 30 miles distant, we could perceive the Mount Meru, a very beautifully-proportioned and peculiarly-formed hill. On my first journey, we had no favourable opportunity of examining it, as it was always enveloped in clouds, and Mr. Thornton and myself both assigned to it a greater height than my last measurement proved it to possess. Of course, with my present deficient means, I am unable to give the precise elevation, but I believe an accurate computation will scarcely make it more than 13000 feet.

Kilima-ndjaro itself was often visible with wonderful clearness for half a day together, and the snow was plainly seen from a very great distance, more especially when the sun was near the horizon in the morning and evening. I remained in Arusha 6 days. The Wa-massai, Heaven only knows through whom, had got wind of my intentions, and had sent a band of some 2000 men to meet me and resist my passage. All manner of negotiations, entreaties, promises of presents, and threats availed nothing: I always received the same reply—"The red man must not set foot on their soil, else their cattle would surely perish." They insulted my people who were sent out to fetch firewood and water, and chased them back into camp, until my porters got so thoroughly cowed that, dreading desertion on an extensive scale, I resolved to pursue my way due north, and at once undertake the ascent of the snowy peak.

Three days' march over the table-land, about 2200 feet high, which separates Arusha from Djagga, brought me within the territory of Uru. Here everything seemed at first to be going on well, but very soon it became apparent that treachery was meditated, so I quitted it just as the unfriendly feeling began to manifest itself, fortunately without any loss on my side. In two days more I reached another small kingdom, that of Mossi.

I was at first most hospitably received here, and the youthful Sultan Kimandara was most courteous; but very soon he began the old African habit of lying and shuffling. I perceived that I could not hope to be any more successful with him than with others, unless I undertook to do something unusual. I therefore, under these circumstances, requested the young sultan to drink blood with me, since, as his warriors had told me, I must either do this or leave the country. Of course the brother in blood of their sultan was now an entirely different personage, and two days later I set out for Kilima-ndjaro, Dr. Kärsten, six of my own people, and two Wa-Djagga forming my company. We passed the first night at an elevation of about 6500 feet, the second at 11,000. For the first 8500 feet or thereabouts, there was a beautiful growth of underwood, after which vegetation thinned off quite suddenly; trees and brushwood continued to grow as high as 9500 feet, but above this there were no more ferns, nothing but shrubs with very short stems, and a species of *Erica*. At last only a few roots covered the soil, where it was not strewn over with huge masses of rock.

On the third day I left my people behind at an elevation of 12,800 feet, and went forward with Dr. Kärsten; ere long, however, my two negroes refused to advance farther, and my white companion was suffering so severely from headache that I was compelled to halt. Barometric and hypsometric observations gave an elevation of 13,900 feet. The actual snow limit, however, was full 2000 feet above us, though we both remarked several spots at which the snow lay at a far lower level. The easternmost peak showed very little snow, which was to be accounted for by its very precipitous sides, thus preventing the snow from clinging to the surface. The prospect was not very encouraging, except where, here and there, the strong breeze drove the clouds asunder; in other parts they collected in confused masses, and prevented us from getting a single glimpse over the Saddle, to the northwards. I now determined to retreat, and, amid deluges of rain, succeeded at 5·30 in reaching our late encampment. Up to midnight the bad weather continued, the wind blowing icy cold, though the thermometer never fell below 32·9° (Fahr.).

At sunrise we perceived that it had been snowing heavily, the snow lying, in fact, upon the spot we had reached the previous evening. The snow, however, at the lowest point considerably farther down, must have been of inconsiderable depth, for at 8 A.M. it had entirely disappeared under the influence of the sun. Two days more brought us back in safety to Mossi, after numerous delays caused by our losing the track.

The rock-specimens collected on the ascent are, 1, Volcanic slag; 2, Trachyte, with felspathic crystals injected; and 3, Basalt, with a few crystals of augite, and here and there a few fragments of olivine. The whole soil around consists of micaceous slate, which has been penetrated by volcanic rocks of ancient eruptions, by later molten rocks of similar nature, especially basalt, and (more rarely) trachyte, as described by Professor Rose of Berlin, after a careful inspection of the specimens I brought back. I saw no traces of fossil organic remains in the stratified rocks of this region.

My return journey led me back to Daffeta and Lake Jipé, whence I prosecuted my route over the Bura hills, and so by Endara to Mombas.

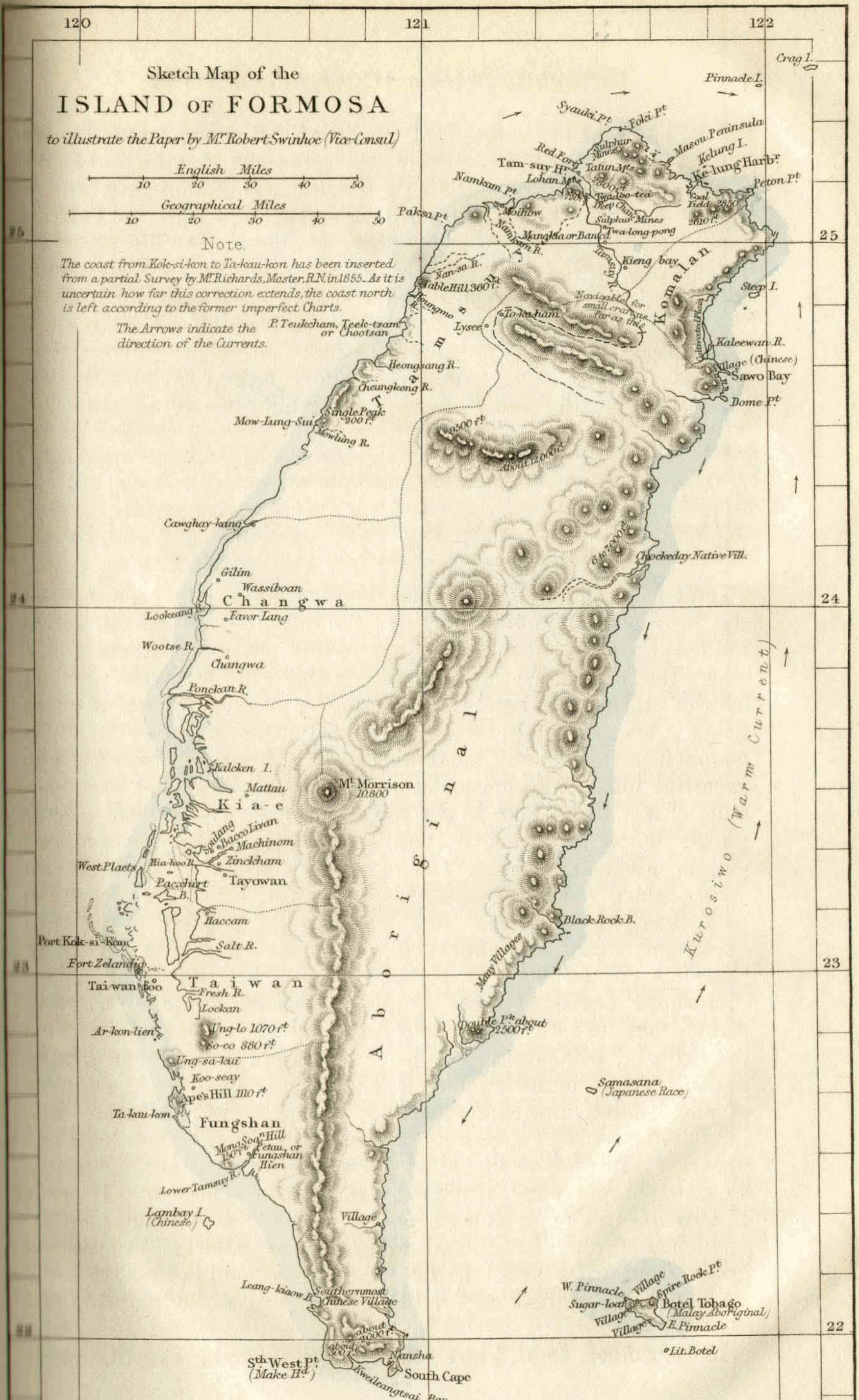
As to the various tribes of men I encountered, they seemed to me to differ greatly in speech and feature. In the limited territory visited by me, I found no fewer than eight distinct languages, having no dialectic affinities whatever. Of the various natives, the Wa-Massai and Wa-Ugono are the most powerfully-built people, but I never met with a man so tall as six feet. The Wa-Djagga, however, are the finest-looking race. A rule which prevails here that no young girl shall marry before she has completed her fifteenth year has doubtless much to do with this well-marked and distinctive superiority of physique.

I wish, here, to call attention to a very remarkable insect called the Donderobo. Through these flies I lost all my asses on my first journey. The Tsetse of South Africa, as is well-known, is dangerous only to cattle and horses; the sting of the Donderobo, on the other hand, is fatal only to goats and asses. The malady caused by it developes itself by enormous swellings of the scrotum and adjacent mucous membrane, and the animals breathe with difficulty, Blood and purulent matter flow from the nostrils, and death frequently ensues within two days after the puncture. On making a dissection I found the intestines covered with small tubercles, and what looked like blisters. I have never myself seen the Donderobo, and, notwithstanding the offer of a high reward, have never been able to obtain a single specimen. The natives told me that it looks like a large thick-bodied fly, and is most plentiful after the rainy season, when their flocks of goats are sometimes decimated.

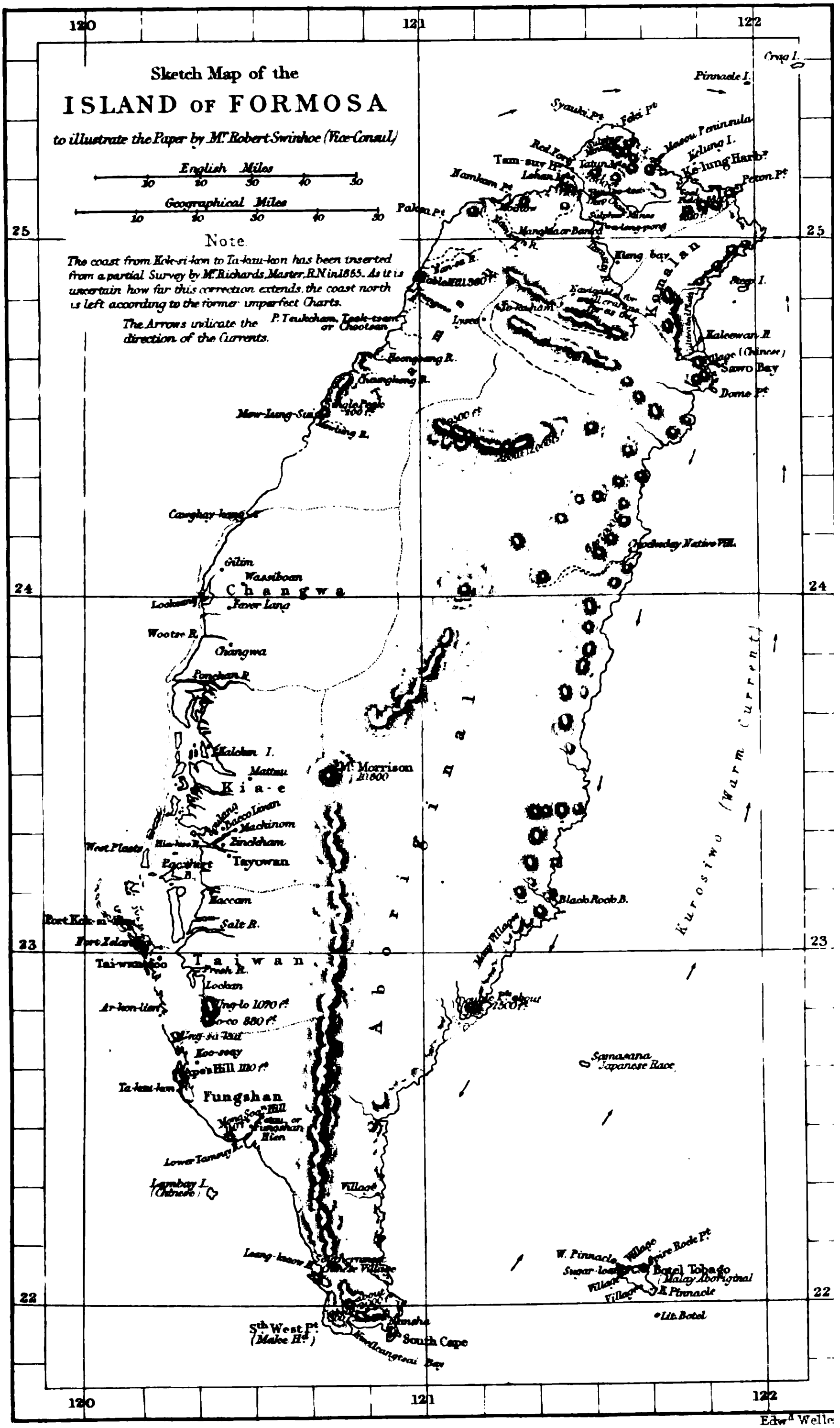
II.—*Notes on the Island of Formosa.* By ROBERT SWINHOE, F.R.G.S., H.B.M. Vice-Consul at Formosa.

TAIWAN, or Chinese Formosa, is considered a Foo or district of the province of Fokien, and is governed by a Taoutai extraordinary, who, though responsible to the provincial viceroy, possesses the privilege of memorialising the Throne direct. "The district of Taiwan," says the Chinese Government Chart, of which a copy was supplied to me by the Formosan authorities, "is bounded in the rear by mountains, and in front by the sea. The ancestral hills of Formosa derive their origin from the Woo-hoo-mun (Five Tiger Gate), the entrance to Foochow, whence they glided across the sea. In the ocean towards the east are two places called Tungkwan (Damp Limit) and Pih-mow (White Acre), which mark the spots where the dragons of the Formosan hills emerged. These sacred reptiles had pierced unseen the depths of ocean, and announcing their ascent to the surface by throwing up the bluff at Kelung-head, by a number of violent contortions heaved up the regular series of hills, valleys, and plains that extend north and south in varied undulations for the space of 1000 leagues (applied figuratively). The mountain-peaks are too multitudinous to enumerate, and the geography of the island too comprehensive to take into present consideration; we will therefore confine ourselves to a few general remarks. In rear of the hills, eastward, flows the ocean; facing them, to the westward, is the sea; and between lies the prefecture of Taiwan." The map then proceeds to define the different departments of the district, and to state what hills in Formosa are visible from what hills on the China coast, and which ports on the island are nearest and most accessible to which ports on the main.

In December, 1860, I received my appointment as Her Majesty's



Published for the Journal of the Royal Geographical Society by J. Murray, Albemarle Street, London, 1864.



Published for the Journal of the Royal Geographical Society by J. Murray, Albemarle Street, London, 1864.

Vice-Consul at Taiwanfoo, in the island of Formosa, and received orders to go, as soon as the Admiral would provide me with transport, and set up a Consulate there. As I had visited that port twice before, and was well acquainted with its want of harbour accommodations, I had no hope of succeeding in converting it into a centre of British trade. We failed to enter Taiwanfoo by sea, on our arrival off the port; and as it was absolutely necessary that I should make some stay in the capital to inaugurate British trade under the new and legal regime, I determined to disembark on the coast and march thither overland.

The city of Taiwanfoo is girt by a high battlemented wall some 6 miles in extent and quadrangular; it is, in fact, a small and poor imitation of the wall of Peking. Within are the houses of the chief citizens, mandarins, and several temples dedicated to the three religions of the empire, comprising Confucians, Buddhists, and Taouists. The open park-like spaces, with fine trees, green lanes, hedges and ditches, give a refreshing and rural aspect to many parts of the large straggling town. There was a sullenness and a stillness about the place which was peculiarly ominous, showing that what life the city once possessed was fast dying out, an event brought about by the shoaling of the small rivers that lead under the wall, which has compelled vessels to seek harbours elsewhere on the long line of coast. The dangers and difficulties of the Formosan coast, even with the aid of the best surveys, cannot be exaggerated. It is true comparatively few ships visit the coast with a view to trade, but vessels bound up and down the Chinese mainland have too often to lie over to Formosa. With the increasing traffic wrecks yearly multiply, and yet the Government takes no steps to survey the island. With the exception of a few special spots, we may say that the greater part of the coast is unknown. I have been assured by adventurous masters of vessels that there are good and safe harbours at the South Cape of Formosa, and probably some on the lower portion of the east coast. The advantages that these would afford, as places of refuge in stress of weather, to vessels availing themselves, during the north-east monsoon, of the Gulf Stream beyond Formosa cannot be too strongly advocated. During our stay at Taiwanfoo, owing to heavy rains, the river increased in volume, and, much to the delight of the authorities and citizens, forced a deeper channel through the bar. A continued succession of these volumes of water might, perhaps, for a time have opened the port for the reception of vessels of moderate burthen, but unfortunately a few weeks afterwards a change again took place, and robbed us of all our hopes by once more shallowing the bar. Lieut. Holder, of the gunboat *Cockchafer*, examined again and again the three entrances by way of river to the city, but in vain. His final verdict was, that no European vessel of the smallest burthen could enter and lie with safety in the so-called port of Taiwan. I was therefore reluctantly obliged to give up all hopes of ever establishing a port of trade at the capital of Formosa.

The Tamsuy River, which was destined to become the British port of trade, discharges itself into the sea on the north-west coast of Formosa, over a bar, giving 16 feet of water at high tide. From its proximity to Foochow it has long been the highway between the Formosan and the provincial capital. The Ta-tun Mountains on its north bank, and the Lo-han Mountains on the south bank, both near its mouth, afford excellent landmarks to the entry of the river; and the narrow gorge, 6 miles further inland, where the river contracts, well defines the limits of the harbour, in which a good many ships of moderate burthen can procure safe anchorage. A sandbank, laid bare at low tides, runs east and west through the harbour, and unfortunately narrows its limits. Above the gorge the river enters a large plain, well cultivated in summer with rice, in winter with corn and vegetables. It here speedily divides into two, the main branch winding away past the town of Mangkia, or Banca, into the wild mountains of the interior; while the confluent branch takes a turn, and after a series of insignificant rapids, terminates about two miles from Kelung. This latter branch I ascended in 1857 to its source, in company with a party from H.M.S. *Inflexible*. On our return to the ship we anchored in Kelung Harbour. We had passed overland to the sulphur-mines, whence we crossed the hills and descended to the banks of the Tamsuy River. I published an account of our trip in the 'Journal of the North China Branch of the Asiatic Society' for 1858. The great danger to shipping in the Tamsuy Harbour is experienced in the early summer, when, after excessive rains and the melting of the snow on the mountains, the freshets convert the entire river into a large rapid, which drives everything before it. Ships then find it difficult to hold ground with their anchors, and the only means by which they can be prevented from drifting to sea is by mooring firmly to the land.

I must make my sketches of Tamsuy brief, and will therefore confine myself to a few remarks on my visit to the interior in search of the aborigines. About two hours' walk eastward of Banca lies a large village, through which runs one of the most laborious works of art which the Tamsuy people have undertaken. The water supplied by the springs in this large marshy plain was found to be brackish and unwholesome. It was therefore thought advisable to bring down a mountain-stream to supply the population of the plains. Such a stream was found about 8 miles in the interior from Banca, leaping down the side of a mountain into the river, in what was then, some forty years ago, savage territory. The savage hamlet in the neighbourhood was assaulted and the aborigines driven away. A tunnel was cut into the foot of the mountain, 16 yards long, 8 feet broad, and about 14 feet deep, and the course of the stream diverted by degrees into this. In the progress of the work the labourers were frequently attacked by savages, and about sixty of their number killed before its completion. The water, which is very sweet and fresh, is led in a prepared channel, maintaining a depth of from 3 to 4 feet, into the village of Kieng-bay, which, being built on the two high banks of an affluent of the main river, required an aqueduct to conduct the water across. A wooden aqueduct was accordingly built. It runs from bank to bank about 30 feet above the river, supported on a series of strong wooden crutches. From Kieng-bay this water-supply is led on to Banca, and thence to Twa-loo-tea, some 5 miles further. The line of demarcation between the territory of the Chinese and that of the aborigines is at once observable by the fine timbered hills that mark the hunting-grounds of the original possessors of the island. The Chinese territory is almost entirely denuded of trees, and cultivated on these interior hills mostly with the tea-plant, introduced from China. The absence of the primitive forest has naturally wrought a vast difference between the flora and fauna of the two territories. Coarse grass has covered the cleared hills, and the place of the woodland birds, the deer and the goat, has been supplied by larks and birds of the plain, and by pigs and hares. At the point I reached, the river divided the two lands, over which the savages were in the habit of coming in boats ferried by Chinese, to barter their wares. Across the river the lower wooded range was considered common land, and not suffered to be crossed except by permission from the chief of the clan.

From the end of November to the first few days of May rain and clouds are the order of the weather at Tamsuy; and on my arrival the mandarins assured me that the two first things usually provided for a visit to Northern Formosa are a good umbrella and a strong pair of boots. The dampness of the air makes it unpleasantly cold, though the thermometer shows a high temperature compared with the same latitude on the China coast. It is well known that the season of the north-east monsoons is one of continued, almost cloudless, sunshine, on the coast of the mainland from Foochow to Canton. It cannot, therefore, be doubted that the cause of constant rain in North Formosa is owing to its propinquity to the Pacific Gulf Stream, over whose heated waters the north-easterly wind blows before it reaches our island, and with its surcharge of moisture, coming in contact with the lofty Formosan mountain-range, and frequent high hills, is forced by their low temperature to precipitate on the island and 12 miles west to seaward. The wind then passes on to the southern coast of China, relieved of most of its moisture, and does not there hamper the clear pleasant winter sky with never-ceasing clouds of rain. Though an apparent curse to the island of Formosa, the beneficial advantages of the *Kurosiwo*, as the Pacific current is called, in many respects no one can gainsay. Its continual northerly flow on the east of Formosa enables the mariner to defy the persistent severity of the winter monsoon. It tempers the climate of Japan much as our northern British climate is tempered by the Gulf Stream from Mexico; and spreading its warm currents along the western coasts of America, it renders them so much more free from the severity of winter than the eastern coasts of that continent in the same latitude. To Captain Maury, late of the U.S. Navy, is due most of what we know relating to the Atlantic Gulf Stream; and for the first concise account of the Pacific Gulf Stream, the thanks of science are due to Commodore Perry's work on his Expedition to Japan. In this work (vol. ii., p. 364) the two streams are considered as starting on their course from nearly the same latitude. The *Kurosiwo* is made to take its source from the Bashee Channel off the south cape of Formosa, and passing up the east coast of Formosa, between it and the Madgico-sima Islands, to increase in breadth, with a central interval of cold water, to bend a little easterly, touching the south point of the Japanese island Kinsin on its northern edge, and thence to continue eastwards, spreading its volume, and including numerous intervening streams of cold water. Much praise is assuredly due for what has already been done in determining the bounds and proportions of this stream; but doubtless much remains to be done, for shipmasters assert that the warm stream flows up the back of Luzon, and has probably its source in much lower latitudes. This would certainly appear to be the case, from the fact of the winter climate of Luzon being attended with almost incessant rain, as at Formosa. I was informed by Captain Meincke, of the *Typhoon*, that there was a current setting down south, close to the east coast of Formosa, and that the line of demarcation between the deep blue Gulf Stream and the muddy coast-water, bound in a different direction, was very well defined. This line of division I had myself previously observed and noted in my report on the circumnavigation of Formosa, but without being then able to assign a cause for the phenomenon. This would naturally be the cushion of cold water that one would expect to find analogous to what Captain Maury speaks of as forming the landward bank on the coast of Florida to his "river in the ocean." I was also informed by the same enlightened merchant-captain that he had observed trees and logs of wood floated up by the *Kurosiwo*, whereas north of Formosa the line of downward set of the China Sea is marked by accumulations of drift-wood, rattans, and so forth. To the kindly conveyance of this stream, I have read from Russian accounts, the Kurile islanders are indebted for the wood they apply to household wants, their islands affording none of their own. The warm water of the *Kurosiwo* manages, however, to find an entrance into Sawo Harbour, as it does also into Kelung Harbour, in both of which places white branching coral, usually characteristic of the tropics, is seen in the deep clear water, adhering to the rocks below, with brightly-coloured coral-fish gliding about amongst its branches. I witnessed these myself in Kelung in 1857, and watched fishermen catching, with hook and line, the richly-coloured fishes. I have not observed such coral or similar fishes anywhere on the west coast of Formosa, and believe that their existence is due to the warm stream. Large numbers of turtles and flying-fish are found in this tepid water all the year. The former occur on the west coast chiefly in spring, and the latter is somewhat rare in the China Seas. In January at Kelung, when it was raining in torrents, the air felt so warm that the cabin doors were obliged to be thrown open. North of Formosa, Captain Meincke informed me, a strong current, setting to eastward, extends up as far as Pinnacle Island, the influence of which is felt even over the tides west and east.

The almost isolated peak of Ape's Hill is of comparatively modern elevation, remains of living corals and shells being found at its summit. It is formed chiefly of volcanic rock, trap, and basalt. From the blocks of conglomerate limestone and fossil remains that lie about near its base I chipped off several specimens, most of which are coral and shells (*pecten*), referable to a late tertiary era. If this be the case, the beds of deposit which have been raised by the upheaval of the volcanic mass would prove of older date than I was inclined to suppose, from the comparatively recent formation of the rest of this low coast.

Judging from the bold appearance of the eastern, northern, and north-western coasts, the coast-line may be said to be in the course of gradual recession rather than of progression. Unfortunately the rock specimens I procured at Tamsuy were from near the coast, and only consisted of remains of modern shells and corals, and some bits of sponges, the portions of the limestone—the prevailing rock of the neighbouring high hills—that I brought with me having no fossils in them to lend a clue to the formation. At Ape's Hill the lime used for domestic purposes is, by the Chinese, burnt out of the white nuggets of limestone that they unearth from the hill-sides. At Kelung they use for this purpose the masses of coral that occur in the harbour. In South China they are obliged to have recourse to oyster-shells.

The coal-beds that crop out on the hills facing the sea, near Kelung, and are there worked by the Chinese, are about 16 square miles in extent, and crop out again in the neighbourhood of the north branch of the Tamsuy River, whence this mineral is also procured and brought down to our harbour for sale. I visited the Kelung mines in 1857, and included the following notice of them in my report to the Shanghai Society, above referred to:—

"It is a long pull from Kelung Harbour westward, round to what is called Coal Harbour, where these mines are situated. These mines are worked by Chinese, who live at their entrance, in huts built of straw and wood. There are eleven or twelve excavations; the mouths opening out, at different heights, on the side of a hill facing the sea. I went to the end of one, guided by a man bearing a lighted piece of twisted paper. The excavation, which ran in a horizontal direction, varied from about four-and-a-half to three feet in height, and three to ten or more in breadth. The strata of coal run along on both sides in parallel lines, from one to three feet in thickness. The roof and floor were composed of sandstone. Water was constantly dropping from the roof, and, mixing with the sand, formed a slimy mud. The hole ran in pretty nearly a straight line for 240 paces: at the end it took a sudden turn to the right. Small wicks in saucers of oil, placed in side niches, lighted up the gallery; and in the *cul-de-sac* we found five or six men at work in a state of nudity, with pickaxes, blunt at one end, and sharp at the other. The coal thus obtained is very small and bituminous, and burns fast, but with great heat and flame. It is very certain they get the best there is in that locality. They asked 20 cents a picul (10*d.* per 133 lbs.) for it at the pit's mouth, and declared that five men at work in a mine for twenty-four hours did not procure more than 30 piculs. They bring out the coal as fast as it is dug, in oblong baskets, containing a picul each, dragging the baskets over the mud on boards."

Unfortunately, as might be expected from its occurrence in tertiary deposits, the coal turns out to be a lignite, and therefore can never compete with good English coal in the Hong-Kong market. In Commodore Perry's 'Expedition to Japan,' vol. ii. pp. 168-70, a comparison is instituted between the Formosan coal, two sorts from Japan, and Cumberland coal, and a decided preference then given, from chemical analysis, to the Formosan over the Japanese. In some respects it is shown to have an advantage over the Cumberland produce, and hints are thrown out as to the probability of a better material being procured if the veins were struck lower. But the fact of its being tertiary coal is quite against this.

As a commodity for steam purposes its value has been often tested. It is found to burn too rapidly, giving out an unpleasant—somewhat sulphurous—stench, and leaving large quantities of light ashes. For small high-pressure steamers it is of little use, besides being dangerous. From its inflammable nature the boats can carry little more than enough for one day's consumption; and the smoke is so thick and heavy that it often ignites the flues. Mixed with Welsh or other good coal it has been found serviceable for large steamers; and for such purposes its cheapness may ensure it a good future trade. In China it is much used among Europeans for domestic stoves; but the communities at the different ports are too small to create a large demand; and it does not seem to be in much request among the Chinese of the mainland, who prefer the dull-burning and equally cheap anthracite worked in many parts of China.

Not far from the coal-mines in North-west Formosa occur the sulphur-mines. Of these I am acquainted with two, which are not many miles apart, and are, I should fancy, subterraneously connected. The first of these, situated between Kelung and Tamsuy, I visited in 1857, when I communicated to the Shangai Society the following note of my visit:—"The sulphur-mine appeared at a distance like a canker on the side of the grass-covered hill, which was fresh and green everywhere, except in the immediate vicinity of the mine. The broad sulphur valley or chasm had everywhere a pale sickly tint of yellow and red; and out of many of its numerous recesses hot steam gushed in jets with great noise and force, like the steam from the escape-pipe of a high-pressure engine. In other spots small pools of pure sulphur were bubbling. At the bottom of the barren ravine rippled a foul rivulet, carrying off the sulphurous oozings from the ground. Within and round about this hollow the earth underfoot rumbled and groaned, and the air was so saturated with the exhalations of sulphur as to become extremely noisome, and destructive to insect life especially, of which we saw abundant proof in the numerous remains of beetles and butterflies scattered around."

The second sulphur-mine is situated on the side of a hill on the north bank of the Tamsuy River, about 8 miles distant from the harbour. From the north branch of the river, 2½ miles beyond the gorge, a little stream bears you well across the plain, from which a land-travel through paddy-fields, and over the lower range of hills, brings you, after a two miles' walk, to the mines. The mould on these hills was very black, containing large quantities of lignite; and in it, some 200 or 300 feet above the sea, were planted tea and pineapples, side by side, both appearing in flourishing condition. The sulphur-mine was here as before, a barren patch among the hills, about 400 feet above the sea, and occupying a space of some two acres in extent. The hills which formed the mine are covered with coarse grass, and are of the same formation—clay, sandstone, and limestone; the latter being often speckled with fragments of lignite. In some of the hills on the Banca alluvial plain, the sides of which were denuded, the limestone showed itself in large disconnected blocks, in parallel lines, partaking the curve of the hill-top, in the same manner as is exhibited by Whaleback and the few other hills that dot the large alluvial plain on which Taiwanfoo is situated, and which form the greater part of the Chinese territory on the south-west. The working of these mines is forbidden by the Chinese Government; and so rigid is the order, that the mandarins are obliged to send to Foochow for the sulphur required for manufacture of ammunition. And yet so lax is the vigilance, when blinded by bribery, that we found the spot alive with workmen. The arrival of Europeans had opened an extraordinary demand for it, to export at large profits to Hong-Kong; and the smaller authorities themselves, more or less interested in trade, soon found some means of relaxing their vigilance in the export of the contraband. Straw sheds of the miners were scattered about the ground in various directions; but the immediate neighbourhood of the mines presented a dead, dreary, Stygian look and sulphurous stench. White, grey, and black were the prevailing colours of the spot, relieved here and there by the red tinge of a stratum of clay and the bright yellow of sulphur crystals; while from all parts of the ground steam was emitted, throwing a haze over the scene, and conveying the overpowering smell of sulphur for miles around.

In some spots steam was rushing out with violence from between the bleached limestone blocks, and forming on the overhanging stones long pendent crystals of clear sulphur, looking like petrified moss of a bright yellow colour. In other places, where pits had been dug, and got filled with water, the violence of the steam produced bubbling of the water, with loud noise, making it leap in continuous fountain-jets, 2 feet or more in height. From the hills above, streams of fresh water ran down into the mines. About half a mile lower down the hills we passed another patch of bleached sulphur-marked stones. The course of a mountain-torrent ran close by this spot. The stream was of fresh water; but lower down, about 200 feet above the plain, it passed over a flat, sandy spot, where sulphurous steam again burst out in all directions, and the water there had become almost of a boiling heat, and strongly tainted; from this it continued a broad, clear stream down the remainder of the declivity, and across the plains to the river; but the water was noisome and undrinkable, though down its banks on either side trickled several streams of sweet fresh water. The sulphur is deposited about the stones in this stream in ochreous and white crystals, and in the deeper parts the rocks, at the bottom, are coloured of a bluish-green tinge. The sheds built about the mine are merely to protect the stoves in which the sulphur is melting, and not to house the workmen, who return nightly to their homes in the valley. Grass is rooted up from the surrounding hills for fuel; and by its aid the grey slate-like mineral, quarried from the pits, is rapidly melted into treacle-like consistence. This is continually stirred until all the earthy metal-like substance is deposited at the bottom, and the pure sulphur floats at the top. The sulphur is then ladled out into hooped wooden tubs, narrow at the mouth, and broad below, and left to cool. When cooled the bottom of the tub is knocked out, and the sulphur drops out in a conical cake, weighing about half a picul, and ready for exportation. The earthy refuse left in the pan is thrown away. The contractors engage to place the sulphur on board the vessel of the speculator at one dollar the picul (4*s.* 6*d.* per 133 lbs.), taking on themselves all risk of seizure, &c., on transmission down the river to the harbour.

The places of Formosa, from which we had to select a port for British trade, are the following, in order of sequence from south to north: (1) Ape's Hill; (2) Taiwanfoo; (3) Hia-hoo River, Kia-e district; (4) Sookean River; (5) Woo-tse River; (6) Teek-tsan, or Choo-tsan; (7) Tamsuy; and (8) Kelung. Of these the 1st, 7th, and 8th alone were available for British shipping; and I recommended that, as Europeans had already commenced trade with Taiwanfoo, through Ape's Hill, that that should be considered the port of the capital under a consular authority, and that Tamsuy and Kelung should be also thrown open under the superintendence of a vice-consul, and that both these authorities should be responsible either to a consul residing in the capital of Formosa or to one at the nearest port of China. But it was considered that Formosan trade was as yet too small to warrant so large an establishment; and as Tamsuy was the most promising port, and at the same time the nearest to China, it was decided to make a beginning there.

The exports from Tamsuy comprise the following articles:—Rice, indigo, coarse sugar, jute, ground-nut cakes, camphor, coal, grass-cloth fibre, wood, rattans, tea, rice-paper pith, pickled vegetables, small pulse, barley, wheat, and sulphur. On the coal and sulphur I have before remarked.

The tea grown on the Tamsuy Hills is not of a superior quality; but I have been informed, on the decision of three tea-tasters to whom I sent samples, that it would readily find a market in Australia, the Cape, and Singapore. It rates at a price of 10 dollars a picul (or 2*l.* 5*s.* per 133 lbs.), and is much imported by Chinese dealers at Amoy and Foochow, to mix with the better class of teas; and the mixed commodity is then sold to foreign merchants as congous, souchongs, &c. The taste of this tea is reported to be very fair; but the objection to it is owing to the coarse mode in which the leaves are prepared and packed. As the hills, however, are no great distance from the harbour, this could be improved by energetic speculators, who might themselves visit the spot on which the article is grown and make their own arrangements.

Rice.—It is owing to the abundant production of this article that Formosa has justly earned the title of "the granary of China."

Sugar.—Taiwanfoo has the advantage over Tamsuy in this commodity, as it is grown in much larger quantities in that neighbourhood; and they understand there the refining process. The land at Tamsuy is well adapted for the growth of the cane; and were it not for Swatow and Amoy usurping the market for North China we might expect a good business in the exportation of this article from Formosa.

Jute is exported to the opposite ports on the Chinese coast for the manufacture of rope and cord.

Grass-cloth Fibre, consisting of the bark of a species of hemp, is grown and exported to China to weave into the summer-grass cloth. It is twisted for the trade into large skeins of different quality. Manufactured grass-cloth and other cloths are sent to Formosa to be dyed with the fresh Formosan indigo, which is famed for its bright and lasting tints. Much of this cloth is also dyed black in a solution of coarse sugar and alum; and some is dyed yellow with turmeric-powder dissolved.

Rice Paper, used largely in China for paintings and fancy-work, is a production peculiar to Formosa. It consists of the pith of the Aralia papyrifera, which grows wild in abundance on the Tamsuy Hills. The pith is pared continuously round and round with a sharp knife, and the thin sheet so produced moistened and flattened. The sheets are then cut in squares of different sizes, and used for the manufacture of artificial flowers, as well as for painting on. In the International Exhibition I exhibited specimens of this pith in the different stages of manufacture.

Rattans of rather a coarse kind are found in all parts of Formosa. A small trade is done in them with the Chinese coast, where their low price often affords them a market more readily than the finer but dearer kinds from the Straits.

Barley and *Wheat* are grown during the winter months. The flour produced by the latter is whiter and finer than that of the corn grown in South China.

Camphor.—The manufacture of camphor has for some years been monopolised by the Taotai (or head mandarin) of the island, and its sale farmed out to wealthy natives. In former years a good deal of the drug was clandestinely produced and smuggled across to China, where it was largely bought up by foreign speculators, and carried to Hong-Kong for shipment to Calcutta, at which place it finds the readiest market, being used by the natives of Hindostan for lubricating the body and other domestic purposes. But now its monopoly is so closely watched that almost the entire trade in it falls to the lucky individual whose Chinese agents can secure for him the monopoly. This bad system has occasioned the price of the article in Hong-Kong to increase considerably, and made the profits accruing to the fortunate monopolist almost fabulous. The cost of the drug, I learn, amounts to only 6 dollars the picul at its place of manufacture. The monopolist buys it from the mandarin at 16 dollars, and sells it in Hong-Kong at 28 dollars. The gigantic laurel (*Laurus camphora*) that yields the camphor covers the whole line of high mountains extending north and south throughout Formosa. But as the greater part of this range is in the hands of the aborigines, the Chinese are able to gain access only to those parts of the mountains, contiguous to their own territories, that are possessed by the more docile tribes. The trees, as they are required, are selected for the abundance of their sap, many being too dry to repay the labour and trouble of the undertaking. A present is then made to the chief of the tribe to gain permission to cut down the selected trees. The best part of the tree is secured for timber, and the refuse cut up into chips. The chips are boiled in iron pots, one inverted over another, and the sublimated vapour yields the desired result. The camphor is then conveyed down in carts of rude construction, and stowed in large vats, with escape-holes at the bottom, whence exudes an oil, known as camphor-oil, and used by Chinese practitioners for its medicinal properties in rheumatic diseases. Samples of this oil have been sent home, and it may eventually become an article of importance in Europe. From the vats the camphor is stowed in bags to contain about a picul each, and is thus exported.

The Chinese Government has empowered the Formosan authorities to claim on its account all the timber produced by the island for ship-building purposes; and it is on this plea the Taotai appropriated the prescriptive right of dealing in camphor. About 6000 piculs of the drug are annually produced in the neighbourhood of Tamsuy.

Woods.—Besides the far-famed camphor-wood, of which there are several descriptions, Formosa is rich in a variety of timber. When collecting material at Taiwanfoo for the International Exhibition I sent to a large timber-yard in the town for specimens of native woods, and procured no less than sixty-five kinds. These I have lately presented to the Kew Museum.

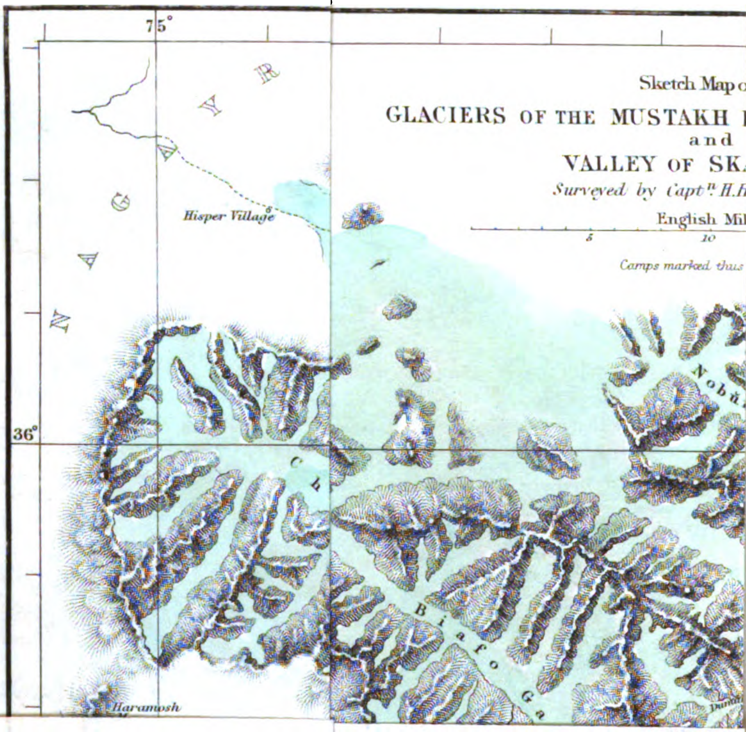
Petroleum, or Rock Oil.—At Tungshao, some few miles below Tamsuy, wells of this oil occur. Through the kindness of Captain

Sullivan I procured two sample-bottles of it, which I have brought home with me for analysis, as it seems to me to bid fair to enter the market, though at present no purchasers are reported. I quote a few remarks on the oil by Messrs. Bevan, Coll, and Harris:—"It is very unlike the Rangoon earth-oil from India, or the rock-oil from America, and more like resin oil. From competent parties, to whom we have shown the samples, we have obtained the opinion that the value would not exceed 15*l.* per ton; but to test its properties accurately a few small casks ought to be sent home for trial, in which case great care should be taken to prevent leakage, as judging from its appearance it will force its way through the best package. The cold weather has a great effect upon it; and during the last few days it has become perfectly chilled in the bottles; but the stoppers being in when it began to be liquid, the expansion was so sudden or great as to burst the bottles, although not one-third full."

Import Trade.—The imports consist mainly of Chinese produce from the ports of Ningpo, Foochow, Chinchew, and Amoy; and through the same channel foreign goods have found their way, but the demand is small. The staple import, as everywhere throughout China, is opium; and to supply the 3,000,000 Chinese colonists of Formosa with this almost necessary of life a large flow is required. Many of the aborigines, I am told, have also learned to smoke it; but they seldom manage to get more than the refuse of the pipe.

Unfortunately for the foreign commercial career in Formosa, soon after the opening of Tamsuy to British trade a rebellion broke out, to which several of the chief authorities of the island fell victims. This at first placed the newly-arrived foreigners in rather a critical position; but the worst, I trust, has now passed. Since my departure I learn that additional merchants have arrived at Tamsuy, and that the foreign customs' inspectorate has taken the port under the shadow of its wings.* The evangelical missions are beginning to send missionaries to the new field. All bids fair for Tamsuy becoming in a few years a flourishing little port; and if the naval authorities would lessen the danger of navigation, and the consequent number of wrecks, by giving us a good survey of the coast, we should have cause to be more than ever grateful to Lord Elgin's treaty, in having thrown open to British enterprise such an island as Formosa.

* Lieutenant Pack, of H.M. gunboat *Snap*, just returned to England, tells me that last winter he had charge of the customs of Tamsuy for three weeks, and in that time collected 9000 dollars for dues and duties.—December, 1863.



Sketch Map o
GLACIERS OF THE MUSTAKH
and
VALLEY OF SK
Surveyed by Captn. H.H
English Mil
5
10
Camps marked thus
75°
36°
N A G A Y R
Hisper Village
Haramosh
Biafo Ga

III.—*On the Glaciers of the Mustakh Range.* By Captain H. H. Godwin-Austen, F.R.G.S., Bengal S.C., late H.M. 24th Regt., Assistant in the Great Trigonometrical Survey of India.*

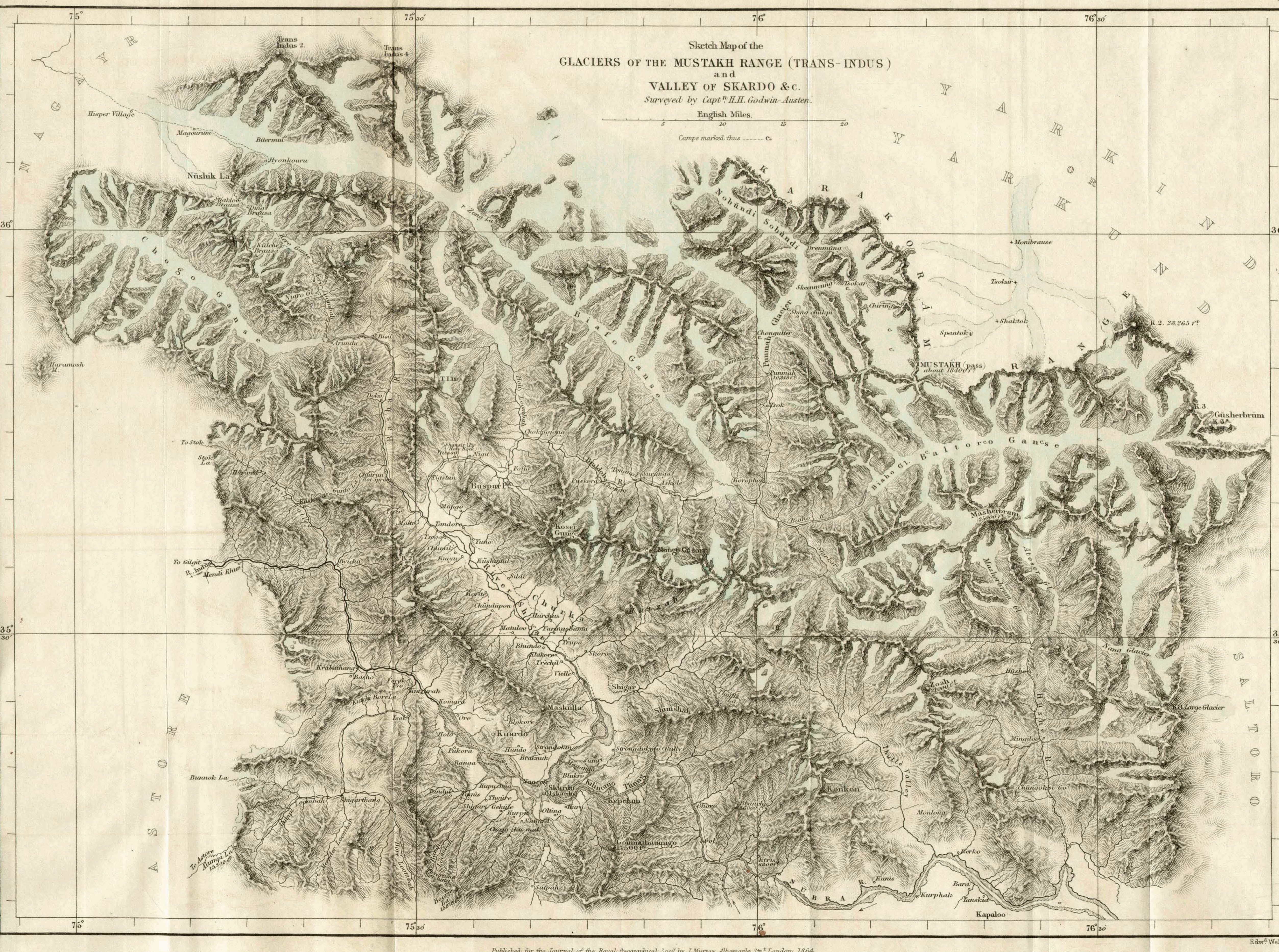
Read, January 11, 1864.

My duties as assistant in the great trigonometrical survey of Kashmir first took me amongst the wild valleys of Baltistan in 1860, and during the summer of that and the following year I was occupied in surveying the vast glacier-system of the Karakorām Range. I shall not here detail the march of 20 days from Srinagar in Kashmir to Skardo in Thibet. It is a well-known road, long since described by Mr. Vigne and Dr. Thompson, and is now very frequently travelled over.

The mountain-survey work of 1860 did not begin till the 5th of August; on that day, my party and I crossed the rapid currents of the Indus and Nubra rivers, on a zŭks or native raft, made of goat-skins filled with air, over which are laid a few light poles of poplar. From the village of Kiris we commenced the ascent of Bianchu, starting on the 6th a little before sunrise. The pull up to the peak was most laborious work; 16,000 ft. elevation, that of Kiris below being 6800, giving a good 9000 ft. for the ascent. From Kiris I next followed up a large stream for a day and a half, and at the head of the valley crossed the pass, over a glacier into the Thŭllè valley, which, at its upper end, branches off in three directions. At the extremities of two of these are passes into Shigar. I crossed over both, and found that they have small glaciers. The third branch presents a much more imposing mass of ice, which comes tumbling down a steep descent, and at its termination is split into three by projecting masses of rock. I remained at this place till the 13th. In its lower ground the Thŭllè valley is well cultivated for wheat; but it looks bare, as there are no trees except a few willows; the river is a tributary to the Nubra. For two days my march lay along the Nubra River, whence I turned off up a ravine on the left, leading towards a pass over a ridge into the Hushè valley. From this ridge we had to climb two pretty high hills, one

* On the completion of the work connected with the measurement of the Karachi base-line, Lieut.-Col. (now Major-General) Sir Andrew Waugh, R.E., then Surveyor-General of India, deputed Captain Montgomerie, R.E., to proceed with the Kashmir series of trigonometrical observations. In the years 1855-6, the triangulation was carried into the heart of Kashmir, and by 1859 had been extended into Thibet. The names of the various assistant-officers, military and civil, who were engaged in this work, and the difficulties as well as hardships which were attendant on the survey of this elevated and remote region, are fully recorded in the several Reports of the Surveyor-General to the Government of India, and were noticed by the Earl de Grey in his Presidential Address to the Royal Geographical Society in May, 1860. (Vide 'Journal of the Royal Geographical Society,' vol. xxx. p. clxx.)

19



Published for the Journal of the Royal Geographical Socy. by J. Murray, Albemarle Str. London. 1864.

Edwd. Weller.

of which is known as Lanzopheuma. It took us two hours from the camp below to get up to the pass, and six hours more to gain the peak; it was a severe pull up. The view which I thence obtained of the Karakorām Range, rising to 22,000 ft., with fine needle-like forms, was truly magnificent; and yet these mountains were only the spurs which ran down from the great masses beyond them.

The 17th brought with it a hard day's work; starting early, we first crossed a ridge which separated us from a ravine beyond; up which, at its head, was a fine peak called Chungoksigo, and which had to be ascended, as it commanded a view of the country beyond the valley. Our way at first was over a broad snow-bed, and then across a slope of loose débris of slate-rock which lay at an angle of 45°. The ground was continually sliding away; the whole mass seemed full of snow or ice in a melting state. However, we managed to reach the summit about 1 o'clock, and crossing over I set up the plane-table, overlooking a ravine on the other side, down which went a small glacier. There was a sharp point of rock some few hundred feet higher than the ground we were on, and as I had sketched in all that I could see below me, we determined to go to it. Our way was over snow, and somewhat difficult. After a while it became so steep that we had to cut steps for the remainder of the way. Finally we reached the point; it raised us altogether clear of the ridge, and I was amply repaid for all the labour by the magnificence of the view. Below was a glacier with all its crevasses and varied features laid out—as on a map: to the left was Zoah, 21,000 ft., right ahead up the Hushè valley was Masherbrum, rising to 25,000 ft., with its pink-tinted rocks shining out in warm contrast with the masses of snow which rested on its sides. Our descent was at first much more expeditious than our ascent had been; lying on our backs, we shot rapidly down the snow-slopes, but the subsequent journey over the loose débris was far worse than the labouring-up had been.

On the 18th and 19th we proceeded along the Hushè valley amidst most splendid scenery, the lofty peaks rising up on either side, and with the most fantastic forms. The river, above the village of this name, consists of three branches; the terminations of large glaciers being visible up the valleys on the left. I began with the valley on the right, and by evening reached the foot of the glacier (Atoser gl.) which comes down from Masherbrum.

On the morning of the 20th I started up the moraine of the glacier, and managed to scramble along for about 6 miles, when the surface of the ice became so broken that it was impossible to proceed. This glacier is continued for 6 miles further up to the ridge, which on its northern face gives off another great glacier, some 15 to 18 miles in length.

I next followed up the main stream of the Hushè River, which issues from a cavern at the foot of a very much larger glacier than the preceding. Some 5 miles up, this glacier forks, each branch being about 7 miles in length; one of them is heavily laden with débris, some of the blocks being of enormous size, whilst the other is quite clean, with only a narrow dirt-band running along one side. On one side of this laden glacier, which I propose to distinguish as the Masherbrum Glacier, was a lake, of which the boundary on one side was a vertical cliff of glacier-ice, a great mass of which broke away as we were returning, and went down with a bang and a splash into the smooth lake beneath.

On the 23rd I followed up the third glacier, which is of much greater thickness than the others, and carries an enormous load of rocky débris; there is a fourth large glacier connected with the sources of the Hushè River which I tried to explore, but the sides were so steep that we could not get upon it at all.

The survey work being finished, I descended the Hushè River to its confluence with the Nubra. The Hushè is joined below, on the left bank, by the Saltoro, a large river which evidently comes down from some distance, but which I did not explore on our way down. From Kapaloo to the junction of the Indus with the Nubra is 24 miles. The following morning we crossed the Indus to the left bank, and another march of 24 miles brought us into Skardo.

In measuring off my work I found that in 23 days I had surveyed 1250 square miles of a very mountainous country. The survey of the Hushè valley was completed; it is a district which presents a very varied character of scenery, from villages surrounded with stately trees and luxuriant vegetation, up to regions of desolation, of lofty snow-clad peaks, and vast glaciers.

I made a short rest at Skardo. As it at first presents itself, with its great overhanging rock rising from out the broad level valley of the Indus, it is picturesque and striking; but the place itself is small and uninteresting.

My next start was from Gol into the hills, to the south of Skardo; in the course of this part of the survey I had two good mountain-climbs—one up a peak of the name of Gommathaumigo, with an elevation of 17,500 ft.; from its summit, if the weather be clear, there is a magnificent view of the Karakorām mountains, or rather of that portion known as the Mustakh; but presenting at this distance only great masses of everlasting snow, from off which rise several fine peaks to the west, and deep in the distance below lies the Skardo valley, and its junction with the Shigar.

I returned to Skardo, where I crossed the Indus in a boat; this being the highest part of its course at which a boat is to be met with. We went on at once to Kuardo, the peak above which we endeavoured to ascend, but were unable to do so, owing to a recent five days' fall of snow.

On the 18th September I went on into Shigar, and thence up a tributary from the eastward for two marches, ascending a peak at its further end. I here came upon a mass of slaty limestone-rocks swarming with encrinites and other palæozoic fossils, the occurrence of which at this place, and near Kashmir as well, seems to elucidate the general geological structure of this portion of the Himalayan chain.

There was yet time for another departure from Shigar; so, starting along the left bank of the river, we followed it upwards for three days, crossed on goat-skins a little above Chutrun, and thence up the Gunto La (or Pass) to Rondu. From this position I obtained fine views up towards the high pass into Nagayr and of the country to the west, which as yet is only known to us by native reports; but the season for surveying was now over.

Preliminary to the survey work of 1861, I had to visit several peaks in the neighbourhood of Skardo; one of these, Thyarlung, a principal trigonometrical station of the Kashmir series, is situated close to the watershed of the Indus on the north, and on the edge of the plains of Deosai; and, though in sight from Skardo, it took me a long round to reach it, as I wished to visit the Boorje La (or Pass) on to the road to Kashmir, in order to ascertain its elevation.

On the 7th of July, my camp marched through Skardo and thence to Kŭrpito, a small village at the entrance of the ravine which leads up to the Boorje La. The road up the ravine is good, and the ascent steady, with precipitous spurs of slate-rock on either side; as several coolie-loads were behind, I made a halt at Chogo-chu-mik (the great water-eye, or spring), for at this spot the stream which for full a mile has been buried beneath the talus from the hills, gushes out as pure as crystal.

On the 8th we started early, the road still good. Soon after quitting our camp-station, the birch and junipers were left behind, and the ravine assumed a drearier aspect. Beyond our breakfasting-place, near a frozen snow-bed, the ascent became very fatiguing. After crossing some snow and a rough stony slope beyond, the pass was at last attained, at an elevation of 15,878 ft. or 8800 ft. above the plain of Skardo. From this position there is a commanding view over the Deosai plains, a curious undulating region of round-topped granite hills, encircled by lofty snowy peaks: winding rills, issuing from tarns of emerald-green water, set in snow-beds, are the only other features of this curious scene. Not a bush, nor the slightest trace of vegetation, was to be seen, whilst the sienna tint of the weather-worn granite surfaces, which pervaded everything, added to the extreme desolation of the scene. During the ascent of the Boorje La, my pulse beat 138 in a minute, that of a Balti, 104.

The first part of the ascent of Thyarlung was grassy, then over small loose débris of rocks which became sharper as we neared the summit. Three hours and a half, however, of steady walking brought us to the summit, 16,844 ft. by trigonometrical levelling. The view, as usual from these great altitudes, was grand and magnificent; but it cannot be said that it was picturesque, being thrown too high above all the valleys, and the horizon on the high peaks lying away to the north and east—but grandly they looked, with not a cloud in the sky. Peak K 2, the highest on this side (overtopped only by Mount Everest in the far eastern Himalayas of Nepal), appeared of an airy-blue tint, surrounded by the yellower peak K 1 (Masherbrum), K 3, and others, all over 24,000 ft. in height. Other minor peaks, by hundreds, thrust up their heads—some snow-capped, some rounded, some bare and angular, running up as sharp as needles.

It was a splendid day, too fine to last as it proved, when we left the Bandè Loombah and marched up to the end of the small glacier at its head; then turning to the left we ascended the Thyarlung ridge, here low, to the Shigar Luggo (Passage). Thence the descent is very steep and bad just below the ridge, and becomes excessively stony beyond, being over moraines from the small glacier of the second order at this place. This glacier has evidently at some former time been much longer than it is at present, whilst, in addition, the snows in winter bring down great masses of débris which lie strewed over the lower slopes and bottom of the ravine. For some distance down, as in the case of the Boorje Loombah, the stream is not visible, till on reaching the end of the rough débris it gushes out in full strength, rushing and tumbling down towards the village of Shigări in the Skardo plain.

This village of Shigar is situated on an immense unstratified accumulation of earth and angular débris, which juts out into the plain, the work of olden glaciers. Taken altogether, this valley of Skardo is a curious study, from the many and great physical changes it has undergone since the mountains were first raised, as they now stand about it.

The height of the upper lacustrine deposit at Kuardo is quite 4000 feet above the present river, and this deposit also rests on the rock of Skardo in the town. This attracts the attention at once, for it indicates plainly that the whole breadth of the valley has at some time been filled up to that level.

The clay deposits nearer the level of the present river, and through which it has cut its course, show that once this Skardo basin contained a vast lake with swampy grassy margins, long subsequent to the time when the higher deposits were settling down in the first deep lake. The eye of a geologist is not needed to trace these past conditions and changes: there are the shells, there are the crumbling stems of the plants and the fragments of wood, not in one stratum only, but first one, covered by three or four feet of sand and pebbles, then another. This succession can be traced over large areas throughout the lower lacustrine deposit, wherever it is cut through by the present drainage lines of the valley, and can be best seen from Kipchun across the valley to Kuardo, and thence up the Shigar River, near the village of that name—everywhere at a uniform level. The temperature of this region, too, has undergone great changes ever since the period of the lower lacustrine deposit. At the village of Kipchun the terminal moraine of a great glacier from the gorge above juts out a full quarter of a mile into the plain, with its great blocks, just as the ice-mass threw them off. This moraine rests on the deposit of valley sand, whilst the lacustrine beds of Kuardo are hundreds of feet above. In this gorge and then some eight miles higher up there is now only a frozen snow-bed.

Ever subject to the great cataclysms of the Indus and its tributaries, more especially from the side of the Nubra and Shigar, with their glacial sources, the plain of Skardo has undergone changes even within the memory of man. The waters from many sources rush in here and spread themselves over the plain, and any obstruction in the narrow gorge towards Ronyūl retains them. This happened in 1841, when a great flood from the Nubra valley did irreparable mischief. At that time the plain opposite the village of Kuardo was cultivated and well wooded—the site of two or three villages—these the flood added to the spoil from above. At Komăra, where the river narrows, the whole was arrested, forming a tangled mass, which caused the waters to rise and remain pent up for nine days over the plain of Skardo. With what terrible effect the body of water which had thus accumulated burst its barrier is still remembered at Attock, where hundreds of men and women, the tents and cattle of the camp of Golab Singh, were swept into the Indus.

From Shigări the road to the ferry over the Indus at Kapashna is across sandy flats, which stretch as far as the village of Hoto. In many places sand-dunes, with their steep slopes to the east, show the prevailing winds to be down the valley.

A short distance above the spot where the boat leaves the Skardo shore the muddy waters of the Shigar River come sweeping down, forming strong eddies and even considerable waves when both rivers are high. The sandbanks are continually shifting, and our boat was constantly aground; but by hauling and pushing, the boatmen jumping into the water on these occasions, the opposite bank was at last gained.

On landing on the right bank I rode on to the village of Kuardo, which lies along a ravine, bounded on the west by a high hill of alluvial deposit and on the north and east by spurs from the peak of Mashkulla. This mountain had to be ascended, being the second step necessary for fixing the positions of the high peaks ahead; but the ascent was obliged to be deferred till the 15th, as the mountains around were all hidden in thick clouds.

In spite of a somewhat scanty supply of water for irrigation, without which nothing will grow in this region, the village of Kuardo is beautifully wooded and green: fields rise in terraces for a distance of two miles along the valley; the houses are scattered about them, surrounded by fruit-trees—apricot, mulberry, walnut, apple; willows are common. The vines are planted at the foot of the trees, and hang in festoons from the branches; they bear largely. The field cultivation consists of wheat, cockscomb, tromber, and barley. Excellent gourds, melons, cucumbers, turnips, &c., are grown in the gardens. The water flows in artificial channels through the fields, and the supply being small, it is economised by being collected into some large tanks, with sides built of boulders and earth, from which a certain quantity is allowed to each Zemindar. The houses, in sets of about eight or ten, are built in two stories: the ground-floor walls are of the rounded stones from the ravines, with mud, or of sunburnt bricks of large size, cut out of the hard lacustrine clay. This lower story is usually about ten feet high, and is either used in the winter as a residence, or serves for the cattle, sheep, and goats. The walls of the upper story are made of strong wicker-work, often double, and well plastered with mud. The upper story does not cover the whole of the lower; but a portion is left with a flat roof, where the owners usually sit, and where they clean their grain. In the better kind of houses the upper story is of wood. The ascent to the houses is by a ladder from the outside, so that the inmates in a measure are secure. The crops are often stored up, as small ricks, on the roofs, as also the grass for the cattle, where it is close at hand during the winter, when the ground is wholly covered with snow. The women clean the grain, and, with the exception of ploughing, do as much of the out-door labour as the men, even carrying heavier loads. When cattle are scarce it is not unusual to see a couple of men harnessed to a plough. The fields are kept exceedingly clean, and are well manured.

During the apricot season the large rocks and the roofs of the houses are covered with the fruit, and in two or three clear days become sufficiently dry to be packed in skins; they are then called "khobanies," and form a very considerable article of consumption in the country: the better sort are exported to Ladak, Astore, and Kashmir. The process of making khobanies is by half splitting the apricots and taking out the stones: several are then inserted, one inside the other, with a sweet kernel in the centre, and they are thus dried in the form of small balls. When required for use they are put to soak in water overnight, and eaten with chupatties next morning.

On the 15th of July the clouds cleared away a little, and starting early we were soon beyond the fields which lead up to the grazing-grounds above. The lower part of this ravine is most curious, it being extremely narrow, from 10 to 14 feet wide, while cliffs on either side rise to between 400 and 500 feet. The cliff to the left is of hard sandstone and conglomerate with huge blocks; the beds are nearly vertical: on the right are metamorphic slates at a high angle. On reaching the upper surface of the alluvial deposit, high pillars of clay, each capped with a large rock, are to be seen, and have a strange appearance. The oldest men of the country say that these have not altered in the least in their time; their grandfathers have told them the same. Some of the taller and more remarkable bear names. The top stone has served as an umbrella to the column of earth beneath, and in a country, where heavy rain is the exception, they may continue as they are, for there is nothing to destroy them.

At an early hour the next morning (16th) we were climbing up the rocky and extremely steep slope, in intense cold. As the ravine faced the west, it was long before the sun rose high enough to throw its rays upon us; but when at last it peered over the wall of rock above us, a burst of joy greeted it from every mouth. As we drew on towards the summit, the actual elevation, as well as the steep slope, made the ascent fatiguing; but once passed, the way along the ridge to the trigonometrical station, to my surprise, was quite level—a few snow-beds only remained.

The view from the station is magnificent, up the Shigar River and down over the whole plain of Skardo, backed by the mountains of the Deosai Plains. The snowy range was only visible here and there amongst the clouds, which were gathering up fast, and I soon saw that a descent that day was out of question. We made ourselves as comfortable as it was possible to do; the plane-table was set up, and as much as could be seen cut in at once. I got into a snug corner out of the wind, and then the day was spent in sundry rushes to the plane-table, whenever, on looking round, some peak would show out from amongst the heavy clouds which hung about. Many such days as these—days of long dreary hours—have to be passed amongst the Himalayas. Our altitude was 16,919 feet.

The frost in the course of the night was severe, and at sunrise next morning the thermometer showed 32° 5′. Next morning, as the light in the east grew stronger, the view was one never to be forgotten. From the south-east to north-west the whole range of snowy mountains was visible, with only a few streaky purple clouds lying beneath them, which, without obscuring any of their sharp forms, added to their immense heights. K 1 (Masherbrum), and K 2, the second highest in the world, overtopped them all, and were conspicuous from their fine shapes.

Down below, the valleys were all in deep shade, and all around was deadly still, save now and then the cry of the snow-partridges, as they came up the hill-sides to bask on the ridges in the early sun. The sound of rushing water far down in the ravines below only just reached us, and the higher streams were all silent.

The sun now rose from behind the Mustakh, and then all became hidden in the intense glare. The clouds formed up wonderfully fast, and in another hour all the peaks to the north-east were obscured. West by south Nanga Purbet (26,629 feet) showed its great rounded form above the snowy ridge of the Alumpi and Bunnok La, and to one unacquainted with the ground would have been taken for a part of it, though 30 miles beyond. We then retraced our steps to the camp below.

On the 18th we left Kuardo for Shigar, skirting the foot of the hills, through the village of Strandokmo, and crossing the Shigar River to the left bank. Here rain and cloudy weather detained us twelve days.

On the 28th of July we removed to a pretty spot, consisting of some twenty houses called Skoro, which gives the name to the large ravine running up to the Pass over into Braldoh. The evening of the 29th was beautifully clear, and it was evident that a break in the weather had taken place, so the following morning our camp was struck, and I started early up the ravine. Provisions for four days were taken, and Mahomed, son of a petty wazir of Shigar, a fine young fellow, offered to come with me. The walking as far as the Nang brok was fair, after that it got very bad. We reached, the first evening, a grazing ground, called Kutzah, 12,553 feet in elevation, and found several fine Yak grazing on the hill sides above our camp.

Whilst lying in my tent, after finishing up my work, I heard an unusual rumbling sound, and on going out I found all the men were wondering what it could be. After a few more seconds of suspense, some Balti coolies, who were cutting brushwood higher up the ravine, shouted out that the stream was coming down, and in a few seconds more we saw a black mass coming out of a lateral ravine from the right, and moving rapidly over the broad slope of boulders which formed the bed of the valley. Before the black stream reached us it divided into two, and we then saw that it consisted of a mass of stones and thick mud, about 30 yards in breadth, and about 15 feet deep. The servants by the side of the little rill near the tents had just time to escape before it came down upon their fires. It was a most wonderful sight: a great moving mass of stones and rock, some of great size, measuring 10 feet by 6, all travelling along together like peas shot out of a bag, rumbling and tumbling one over the other, and causing the ground to shake. The large rocks lying in or near the edge of this moving mass would receive a few buffets, totter a little, and finally roll in amongst the rest to carry others away in turn. No one, who has not seen a flood of this kind, can form any idea of the mighty power of transport which the accumulated masses of water and melting snow acquire at these times, and I was almost bewildered by the spectacle.

Our first alarm happened about six. Shortly after another body of stones came down, not so large as the first, but travelling much faster, as it took the bed of the first and so met with fewer impediments. These "shwās" are of frequent occurrence in the ravines, particularly when the sides are of crumbling rock; they originate in land-slips, which stop the streams for a time, and often assume such a size as to cause great injury to the cultivated tracts and villages below.

I started at daylight on the 30th, and after crossing the path of the rock-stream of the previous evening, commenced the ascent of the spur from the Skoro La, which, though grassy, was very steep. At 11 A.M., after having come up 4090 feet from our morning station, we gained the Pass, 16,644 feet. Beyond was a wild and desolate scene of huge jagged rocks rising out of the snow, from which a glacier stretched away to the north. This glacier, though not of the largest size, is a very perfect specimen, running up to an elevation of 19,000 to 20,000 feet towards the high peak Trans-Indus 13, or Mungo Gŭsor. Its length from the Pass to its termination is rather more than 6 miles. Very little of the Braldoh valley was visible, but some of the high peaks beyond.

Opposite the village of Askolè the Braldoh is crossed by a rope-bridge, 270 feet in length. This fine tributary to the Indus is here a roaring boiling torrent, of an ochre colour, showing that its glacier sources are not far distant. The bridge is composed of nine ropes as a footway, with nine sets on either hand to hold by: the ropes are made of birch twigs. The passage across was by no means pleasant.

The country on this side was even more bare and rugged than that about Skardo: all the high points around were snow-clad, and glaciers of the second order filled the upper portions of all the ravines. Askolè is the furthest village on the right bank of the Braldoh, and contains about twenty dwellings. A few willows are the only trees to be seen. Some older and larger than the rest, surrounded by a wall, and called the "Bagh," were assigned to me, under which to pitch my tents. Save M. A. Schlagintweit (afterwards killed in Yarkund), I was the only European that had ever been seen there, and my arrival was an event in this remote spot.

The weather cleared in the evening. The next morning broke without a cloud, and an early hour saw our large camp of 66 men getting under weigh. Leaving the village, we passed out between two small guard-towers, substantially built of stone and timber, and which served in former days as a defence against the people of Nagayr. About 2 miles on, where the path leads along the face of a cliff washed by the river below, there is another tower, with a steep and difficult approach. On the exposed side twenty men might hold a large force in check. They told me here that the Nagayr men once surprised and carried off the guard by ascending the mountain above and taking the tower in rear. For guides I had two good Shikaries, men who knew the country well, and who had been into Yarkund.

About noon we reached the foot of the immense glacier of Biafo, which terminates at an elevation of 10,145 feet. Its broad belt of ice and moraine, stretching right across the plain for more than a mile and a half, completely hides the river which flows beneath it, the terminal portion of the glacier abutting against the cliffs on the opposite side of the valley. Two rivers issue, one on the extreme right, the other on the left. I took that on the right, which comes rushing out of an enormous cavern, at a short distance from which we mounted the glacier, up steep masses of large débris and slopes of ice. On reaching the more level portion of the glacier, no trigonometrical points being visible, it was necessary to climb a high spur to the west. By 2·30 we had gained a point 2500 feet above the glacier, and whence we had a good view of it, but as it trended a little to the north-west, it was hid for the greater part of its length. From this station several known peaks showed their heads, which enabled me to carry on my work with good accuracy.

That night's camp was on a sandy plain, which was covered with wild currant and dwarf juniper bushes, and only a little rill trickling from the glacier separated us from it. The night was frosty. The way near the junction of the Braldoh and Biaho rivers was difficult for about 2 miles, there being hardly room in some places for the feet. After rounding a point the river turns to the north, and, the track descending to it, there is fairish walking, over sand and boulders, but here and there small branches of the river have to be forded. Onwards from this the river narrows, and we frequently had to take to the water, as we came abreast of each lateral ravine, the streams down which were now in full force, having their sources in small glaciers of the second order. From the terminal moraines which abutted on the main river, it was very evident that at some time glaciers had descended the whole length of the lateral ravines. A great flood of water-borne detritus had just rushed out of one of these ravines, the muddy water of which was still flowing on as we arrived at its bank.

We encamped at a spot known as Tsok, where one of the main glaciers of the river (Biaho) comes into view. This glacier leads up to the Mustakh Pass: and every ravine had its strip of ice extending down to the river, or very near it, and running upwards some 5 or 6 miles.

On the morning of the 4th I ascended the ridge above our camp, whence I got a first view of a magnificent glacier, with three large feeders stretching away beyond it, the sources of the Biaho river. I wished to gain the range at the head of the spur, but the ice was so steep that it was altogether impossible. From this point the Punmah glacier is seen in great beauty: it terminates in an enormous chaotic expanse of débris, the lines of moraine not being distinguishable from one another for some miles up, where they run on till they end in a few narrow bands of dirty ice. Except for a few black slopes of ice and the terminal cliff with its caverns and black rents, one could hardly, even on closer acquaintance, believe a glacier to be there, so completely is its lower portion concealed beneath the materials it has brought down.

After finishing my work, and taking a sketch of the view upwards, I descended in the direction of a much broken glacier which comes from the north-west. This glacier has in some past years been upwards of 100 feet thicker than it now is, as shown by its lateral moraines, and the grooved and scratched rocks on either side. Past the terminal moraine of this lateral glacier a level plain extends for 2½ miles to the foot of the great Punmah glacier, the elevation of which is 10,318 feet. Here our camp was pitched just beyond the reach of the blocks and stones, which, detached by the melting of the ice, kept incessantly coming down the ice-cliff, now one or two at a time, and now in great masses. As we sat over our fires, the noise was to be heard late into the night, but at longer intervals as the night advanced. We were now fairly within an ice-bound region, which for bleakness and grandeur is perhaps not to be surpassed: its glaciers exceed those of any of the mountain-ranges of the world, and are equalled only by those of arctic or antarctic regions, for though the Himalayas of Nepal are quite as high as those of the Mustakh, yet being so much further south, and of less breadth, the glaciers have not a like extent.

Starting upwards from Punmah, the track skirts the right bank of the glacier for a distance of 2 miles, following the hollow way between the mountain on one side, and the loose stony slopes of detritus, shed off from the glacier, on the other. This glacier is on the advance, together with all its detritus. This was obvious at once, from the covered scrub and upturned turf immediately in front; and the vast power with which it moved was well displayed at one place, where a hill of stones and earth projected out a little. This was rent a long way down, and was fast giving way before the advancing moraine. The thickness of the ice must have increased by from 60 to 80 feet, as the old camping spot of Punmah is now quite covered.

On the hill-sides were a few small shrubs of birch and juniper; clumps of the red rose grew close to the glacier. During the summer months the Yak are driven up to be grazed here and in the ravines about; they do not thrive in the villages lower down, where at times the heat is considerable, and where they are much teased by the flies. The half-breed between the Yak and the common cow, called Bzo, is a fine animal, and principally used for ploughing; these remain below. The cows of the Yak are not kept for their milk, the whole of which goes to the calves. The number of the pure breed is small, and nearly all are brought over from Yarkund. They are to be met with in all the high villages of Baltistan, but I never saw more than five or six together.

After passing the junction of the first considerable glacier from the left, called Dumūltèr, and which has its sources 8 miles up, our course lay over the uneven surface of ice and moraine, and after crossing this tributary, was again on terra firma, as far as the encamping spot of Chongnoltèr. The track lies so close to the steep slope of the transported blocks of the side moraine, that in spots there is considerable danger from the falling rocks. These are detached without any warning, and come tumbling down the incline; and we often had to make a hard run in order to pass ugly-looking slopes, where no footing could be obtained on the mountain-side. This camping spot is small: there was hardly room for the four tents; and the coolies found sleeping-places under the rocks around.

On the 6th I struck diagonally across the glacier towards the left bank, through as extraordinary a scene as the imagination could picture; it was the desolation of desolation. The lofty peaks above were cased in cloud, through the breaks in which their strange forms looked more gaunt and magnified in size. There was not a speck of green to relieve the great precipitous crags of grey and ochre. The surface of the glacier around us was either a succession of ridges more or less stony, or—when the lines of medial moraines disappeared—like a sea of frozen waves. Small pools of emerald-green water, with cliffs of ice, filled many of the hollows, while in some parts flowed streams of running water, which generally ended abruptly, by discharging down some crevasse. On every side were heard the noises of falling stones as they rolled down the ice-slopes or dashed into the pools. From the base of the mountains on one side to the other, was a distance of over 2¼ miles. We followed the left bank for 3 miles, along a more open track, and reached a camping spot called Shingchŭkpi. The continual change going on in these regions was shown at this spot. Mahomed had told me that in front of the encamping-ground we should find a lake with possibly some duck in it, as he had shot a couple there on his last visit. On reaching the spot not a vestige remained; the glacier and its moraine now covered everything, and there was barely room for the tent between the mountain-side and the ice. Lower down we had passed a small piece of water, which was rapidly silting up from the sand and mud carried down into it from a small tributary glacier in the hills above. Every ravine here had its glacier, and many of these ran for 6 or 8 miles up amongst the sharp lines of peaks above us.

The next day was a halt, the weather was so cloudy that it was out of the question to think of making even a reconnaissance of the ground about us. About 6 in the evening we were surprised by the sudden appearance of four men from Yarkund, who turned out to be Baltis of Shigar and the Braldoh, who had emigrated to Yarkund some years back, and had now come over to see their friends on this side. I soon got into conversation, and learned from them a good deal about the country they had come from. The poor fellows had suffered a good deal while traversing the mountain portion of their route, having to travel by night and hide away during the day, on account of the robber tribes. These men wore the sheep-skin cap and long-skirted coat of Yarkund, with voluminous sleeves padded with cotton; thick leggings, and stout leather boots or pubboos, completed their somewhat stout appearance. The goodness of their clothing contrasted strongly with that of their brethren of Baltistan, and showed that emigration had been advantageous.

The 8th was still cloudy, so after a vain attempt to get an observation, the camp was struck, the little scrub was made up into fagots, and we started for Skeenmŭng, where the glacier branches into two. It was not far, and in full view; but it was getting dark before we reached it. The first part of the way was very rough, over loose moraines; beyond, these became more separated, with clean bands of ice between. The ribboned structure of the ice was beautifully shown on this glacier, sloping inwards at an angle of 32°. Opposite Skeenmŭng a large tributary comes down from the mountains to the south. Here the ice was again much broken, and we had to zigzag about the crevasses before finding a place where we could leave the glacier for *terra firma.*

Skeenmŭng is a capital spot for a camp in this wild country. Luxuriant grass grew along the banks of a small stream, flowing from an old moraine, and which lower down flows in under the main Punmah glacier. The spur above the camp went up with a gradual slope to the rocky peaks above, the favourite resort of the Ibex, as its name denotes.

On the morning of the 9th, I proceeded with four men up the main glacier, which comes down from the mountains to the north, and which is known by the curiously-sounding name of Nobŭndi Sobŭndi. The way was dreadfully rough as far as a spur known as Drenmŭng, and lay sometimes along the moraine, sometimes along the mountain-side. We passed the now dry bed of a lake 400 yards by 200, which had been formed by the pent-up waters of a side glacier, and which had been full 50 feet deep from the horizontal line its upper level had cut along the ice-cliff. Lying along the old line of its shore were some miniature icebergs, which had fallen from the glacier, been drifted away, and stranded where we saw them. Some of the blocks measured 15 × 18 × 10 feet. They were melting away, but had seemingly been there for some days. This same day we came across several broods of the gigantic Chiçor, just able to fly, the old birds still with them. I shot three, and Mahomed, who got into a great state of excitement, caught two young birds that ran and hid under some stones. They are excellent eating, and were a welcome addition to our fare.

The view from Drenmŭng was magnificent. Two stupendous peaks rose up from opposite sides of the glacier to 23-24,000 feet, covered with snow from base to summit. To the right the glacier ran up some 8 miles, backed by other enormous peaks; to the left the Nobŭndi Sobŭndi glacier, with a breadth of 1¾ mile, stretched away 14 miles in a direct line, to where numberless other ice-streams meet to form it. The sun setting behind the line of snowy peaks in that direction, lit all up with a beautiful pink tint; whilst the rocks of the moraines, red, yellow, and green, heightened in colour by the wet, sparkled in the sunlight.

We now struck directly across the moraines for about half a mile till we reached the clear ice, which was traversed by numerous large streams, but with scarcely a single fissure. The streams, after running for some distance, and becoming very considerable, usually end in wells, down which the water falls with a roar. These wells seem to be of great depth. It was nearly dark when we again arrived opposite Skeenmŭng, and now arose the difficulty as to where we should find a place at which to get off the ice, the side of which was a cliff upwards of 100 feet in height. After several unsuccessful attempts, with the darkness increasing, and all of us running here and there hunting about for a feasible spot, one of the coolies at last found a way down a crevasse nearly filled with rocks, into which we went, and out of which we got on to a ridge, and thence to the ground below. Earlier in the day we should not have managed this, but now, fortunately, the stones had all become frozen to the surface, and afforded firm support to the feet. It was only with the last glimmer of twilight that we got off the ice. A little longer, and a night on the glacier, and without covering, would have been our portion; with the cold wind we should have been frostbitten to a certainty, and perhaps laid up for some time.

From the camping-ground of Skeenmŭng there is a stiffish ascent to a fine peak above, which we mounted on the 10th. From below it seemed quite near, and I imagined that we should accomplish it quickly, and return again, but I was terribly deceived. The first part of the way was good walking, but as soon as we got on the talus of angular rocks it became very laborious, several of the men became ill with bad headaches and lay down, and we did not reach the highest accessible point till 3 p.m. This I found was 18,342 feet. It was a lovely day, every mountain around stood clearly out in view, with all its features distinctly seen; but I was disappointed that neither peaks K 1 nor K 2 were visible. The view up the Nobŭndi Sobŭndi glacier, to the great plateau of ice whence it takes its rise, was grand in the extreme, as also downwards along its whole surface to Chongulter. From this station the two reaches of this broad ice-river are seen at once to the south-east: the pass over the Mustakh was in view at the end of another lateral glacier of vast proportions. The great peaks of Trans-Indus, 4 and 11, were visible beyond a level plain of snow, at an elevation of 22,000 feet. It is a vast sheet of ice, with only a few sharp points of rock sticking out here and there. Snowy ridges stretched away towards Yarkund. We returned to camp in the evening.

On the 11th, the weather being still clear, we started early for the direction of the Mustakh or Pass over the Karakorām Mountains into Yarkund. "Mus" is snow, and "takh" pass, in the Yarkundi language. Our path lay along the ridge of an ancient moraine, now grown over with grass, and showing the great thickness which the glacier at some former time must have had. We quitted this at the camping-ground of Tsokar, where are some small tarns of crystal water, which give the name to the spot. Thence we proceeded over the ice, which here becomes nearly free from moraine ridges, though the surface was difficult from being broken into hollows.

The last camping-place on the Mustakh glacier is at a spot called Chiring, which we reached about 3 P.M.; the moraine here dwindles to a few scattered blocks on the surface of the ice. It took some time to collect enough of these to form a flooring. This serves to keep off the cold; and as driving pegs was impossible, they served to tie the ropes to. The smallest patch of rock on which to put a tent would have been welcome, but such was not to be found. The mountains rose from the glacier in sheer cliffs. It was a case of a night on the ice, and no help for it. After sundown the cold became very severe. The coolies were not able to sleep the whole night through; for as our fuel had to be carried with us, no fires could be afforded except for cooking. We all went to rest early, and did not turn out till the sun showed over the immense cliffs above us, which was not till about nine o'clock.

Leaving camp, and taking with me eight men with ropes and other appliances, we started up the glacier, which is here about 1½ mile broad, with a slope of about 8°. For the first 3 miles the crevasses were broad and deep in places only, and we could avoid them by making detours. They soon became more numerous, and were ugly things to look into, much more so to cross—going down into darkness, between walls garnished with magnificent green icicles from 6 to 20 feet long, and of proportionate thickness, looking like rows of great teeth ready to devour one. I tried with our ropes to sound the depths of some of these fissures, but all of them tied together only made up 162 feet, which was not long enough. The snow lay up to the edges of the crevasses, and travelling became so insecure that we had to take to the ropes, and so, like a long chain of criminals, we wound our way along. In this mode we moved much faster, each man taking his run and clearing even broad crevasses, if they crossed the direction we were travelling. The snow was about 1½ foot deep, and hard when we started; but as the day advanced it became soft, and walking more laborious; besides this it would every now and then break and let us down to the hard ice below. The larger crevasses revealed themselves, but the surface snow hid all the smaller ones, and hence a feeling of insecurity. I kept some coolies ahead feeling the way, by probing the snow with the long poles we had brought with us; so our progress was provokingly slow. Under the pass the breadth of this ice-basin is two miles, with an undulating surface; small glaciers bring down their tributaries to it out of every ravine, and the loud reports of the snow falling from the cliffs around was heard unceasingly.

In spite of difficulties we had got on favourably till within a mile of the pass, when the clouds, which had been gathering fast, began to look so threatening that I thought it best to take the opinions of the men with me; and, guided by their experience, I gave up the idea of proceeding further. By the time the fire was lighted, and the boiling-point ascertained (which gave 182·8, air 42, corresponding to 17,301 ft.), and other observations taken, all the peaks around had become quite obscured. The Pass was distant about 500 ft. above our turning-point; we had to beat a hasty retreat down towards Chiring, the snow falling fast. The glacier was making most disagreeable noises—crunching, splitting, and groaning to an awful extent—caused by the vast body of ice, 2 miles across, here forcing itself through a channel only a quarter of a mile broad, and with an increased slope. The only other European who had tried the Mustakh Pass was M. Schlagintweit, who was equally unsuccessful, clouds having driven him back, as they did in my case. I had gone as far as was necessary towards the parting ridge; still, I should have liked to have crossed the Pass; but want of time, there still being much work to be done, prevented another attempt. My great object had been to get a march along the glacier, and determine the ridges on the northern side. This is quite feasible, and with a small guard the survey might be carried into the Yarkund country for a considerable distance, as, from all the accounts I heard of the tribes, their numbers cannot be great, nor their matchlocks much to be dreaded. It was in a disappointed mood that I left Chiring for Punmah. We passed the night at our former camping-place, Skeeumŭng, and the next day made a short march to Shingchukpi. As most of those who had gone up the Mustakh Glacier had sore eyes afterwards, it was advisable to keep quiet for a day.

The following day, instead of taking the path by which we had come up, I followed the line of moraines on the left bank, the whole way to Punmah. The day being fine and clear, the splendid peaks known in the Survey as Trans-Indus, No. 2, and B. No. 15, were in full view, running up into perfect needles of rock when seen from this side. Up the glacier the view was backed by the peaks that overhung the Nobŭndi Sobŭndi. By evening we reached our old camping-spot at Tsok, and bid good-bye to Punmah and its splendid glacier.

We were now bound for the other main tributary of the Braldoh river, which unites with the Punmah branch some 2 miles above the Glacier of Biafo, and which is called the Biaho River. Thanks to the Shikaries of Askolè a secure rope-bridge spans the torrent at a spot called Dumordo, which we crossed on the morning of the 15th.

Our first halt was at a spot called Burdomŭl, at the commencement of some ugly slopes of clay and stones, having deep gullies cut through them from the ravines above. At times these are the lines of watercourses; now they were all dry. The sides of these gullies were very steep, so that we had to cut out steps in order to cross them. The men also had long staffs, with a short cross-piece of ibex-horn at the end, which the Shikaries of these valleys always carry to aid their steps along the steep mountain-sides. After passing these slopes the river-bed widens out to about 1½ mile, the Biaho flowing along in numerous channels, large and thick deposits of clay and angular rocks lying upon the mountain-sides, with a high face of cliff cut clean through wherever a ravine above occurred. At the foot of these cliffs were narrow belts of thorny scrub, with coarse grass, full of hares; these, scared by the large party that suddenly broke in upon their solitudes, every now and then scampered away in full flight up the hill-sides.

The weather was still overcast, but through a break in the clouds I once fancied that I recognised the form of Peak K 2. At 2 P.M. we came in view of the Biaho "Ganse," or Glacier, with a breadth of 1¼ mile at its terminal cliff, and which, from its height and vast slope of débris, showed that its thickness was far greater than the Punmah Glacier.

We reached the foot of the glacier at 4 P.M., and camp was pitched about 600 yards distant. The Biaho comes roaring from an immense cavern in the ice-cliff immediately opposite, and the noise of the rolling boulders as they came in contact was heard incessantly from under the water. From the spot we occupied, only about 2 miles of the surface of the glacier was visible, very steep and rugged, and I could see only one spot where it looked at all feasible to make the ascent of the terminal débris. Above the line of ice there shot up sharp needles of granite rock, the ends of the projecting spurs from the range which separates this valley from that of the Punmah.

Within the last 4 or 5 years the main river has moved its place of exit from the left to the right bank. With this change the gold-washings, formerly existing here, are no longer profitable. From the fact that gold has been collected here it is clear that the Masherbrum range, which separates the waters of the Nubra and the Braldoh, is the auriferous source, and is that which sends down its ravines those golden sands, which, more particularly in the Kapaloo district, give employment and subsistence to so many men during the winter months.

On the 17th we again left *terra firma* for the region of ice, amidst which we were to remain for some days. No one had been this way since the days when the track to the pass into Yarkund lay in this direction, which was about the time that Ahmed Shah became Rajah of Skardo, a man of whose civility and assistance Mr. Vigne, in his Travels, makes grateful mention. The memory of this native ruler is still cherished by all the people of this part of the world, who sigh and wish in vain that the Balti Rajahs of Skardo might once more reign over them.

We got over the terminal slope of the moraine after about an hour's heavy work, and reached the summit of the slope. We now found ourselves on an open and nearly level expanse of shingle, with a few large blocks here and there. The slope was not greater than 4°. The ground we stood on looked exactly like an old shingle-beach, and all were delighted at its seemingly smooth surface; but the level plain proved to be a succession of deep hollows and long valleys, separated by ridges of shingle, which being all of the same colour produced the appearance of a uniform level surface. The labour of descending and climbing out of these hollows was very great. No direct line of march could be kept. When the slopes became great, and when stones lay on the ice these came down in masses; a constant look-out a-head had to be kept, and long rounds taken, so that at the end of the day's work I found that we had only gained 4½ miles in a direct line, measured on the plane-table. The rocks on either side of the glacier rose in sheer cliffs of 1000 ft. and upwards, and the ice was so broken up near the sides that it was difficult to get over it.

Close to our camping-spot the dry hollows, amongst which we had all day been wandering, became replaced by hollows filled with water, forming lakes of all shades of yellow and green, others as clear as crystal, through the waters of which you could see to a great depth. Other pieces of water, where the side was a cliff of ice, were covered with large floating blocks. The small waves work out lines at the water-level and undermine the ice, which every now and then breaks away, and falls with a tremendous bang into the deep waters beneath, sending high waves across the expanse of still water. Showers of earth and stones also keep slipping off the ice-slopes into the water during the hours that the surface-ice is melting; and our coolies amused themselves in helping the larger blocks over the edges. These lakes measure 500 yards or so in length by from 200 to 300 in breadth, and were to be met with for more than 2 miles along the centre of the glacier which here was very level.

The night was bitterly cold; a fresh easterly wind blew from the direction of the snowy peaks at the head of the glacier; nor could we afford much fuel, for all our wood had to be carried forward with us. Next day the ground was similar to that of the day before, up to 10 A.M., when the moraines became more defined and their ridges flatter: there was more ice, and the débris was larger and more dispersed. Streams began to appear traversing the surface, then losing themselves in cavities; and there were good straight bits of a quarter of a mile, with no need of detours. About 2 miles up from the end of the glacier the medial moraines became quite distinct from one another. Enormous blocks were to be seen on every side, some perched up on knobs of ice. Some, lately fallen, lay by the sides of their old supports. The northern side of the ice was still a confused heap of débris, pile upon pile, with deep trenches and gullies, and was quite impracticable as a line of march. By means of ropes, poles, and hatchets most places can be passed; but I always found that the shortest plan was to make a circuit where it could be done, and so avoid all difficulties. The scenery along this glacier is magnificent; on both sides large tributary glaciers descend from the Mustakh ridge on the north, and that of Masherbrum on the south. None of those on the north are less than eight miles in length, and the ridges whence they have their sources have an altitude of 22,000 feet. These lateral glaciers were separated by sharp precipitous ridges of granite, from which spikes of rock jutted up here and there. Peaks K 3 and K 3*a* (Gūsherbrūm) were visible, towering up ahead; but I had all day been looking out in vain for Peak K 1 (Masherbrum), which I wanted a sight of in order to fix my distance up the glacier. So, leaving the men to pitch camp in as sheltered a place as they could find, I pushed on ahead, and on my rounding a spur, the great peak came into full view—one vast mass of ice falling on all sides into glacier. The pale ochre-coloured rocks showed here and there only, and in beautiful contrast to the pink-tinted snow of sunset, giving an appearance of much greater distance than the reality, for its summit was only 6 miles from me in a direct line. From the Nubra River I had reached, in 1861, to within 4 miles of the summit of Masherbrum: nearer approach on this side would not be easy, as the glacier-drainage runs nearly due east and west, close at the back of the northern face. The mass of snow, with the two cone-shaped peaks (K 3 and K 3*a*), was called Gūsherbrūm (fine-gold) Peak.

This night on the glacier was dreaded by us all; for in the evening the wind from the east sprung up again, and the cold became intense. The ice was much exposed, the valleys between the ridges of moraine being bounded by cliffs and slopes of glassy ice. At sunset every puddle and lake in the glacier began to film over with ice, which in the morning was more than an inch in thickness. The wind blew all night, getting stronger towards morning; and I pitied the poor coolies with only the rough, sharp stones to lie on, and separate them from the ice. The Balti, who carry only one rug, huddled together two or three under the same covering. Mahomed told me next morning that he heard them saying, "Would that the Sahib felt it as cold as this! he would soon go back." Few, if any, got any sleep; and all were right glad when the sun rose over the peaks ahead.

As yet I had seen nothing of the great Peak of Karakorām (K 2). I knew that it could not be far off, but began to have some doubts as to whether it might not be beyond the Karakorām watershed. The end of one of the spurs from Masherbrum seemed the only accessible place whence any sufficient altitude could be attained, and so we made for its base, across the moraines and ridges of ice. The foot of the ascent reached, we found good footing for about 1000 feet, and then came some steep rock; after this another slope was gained. When we reached the ridge of the spur, Masherbrum came into view. Eagerly I had looked, whenever we stopped to take breath, along the line of snowy mountains to the north in search of the Great Peak; and now, fixing the position on the plane-table, I showed those with me the mountain behind which lay the peak I had toiled up so far to see. Following up the ridge, another 1000 feet of elevation was gained, when a distant bit of rock and snow could be seen just peering above the nearer snow-line. After another sharp push up to a point where it was impossible to mount further, there no longer remained a doubt about it. There, with not a particle of cloud to hide it, stood the great Peak K 2 on the watershed of Asia!—the worthy culminating point of a range whence those waters have their sources which drain such vast regions. The elevation of Peak K 2, as determined by Capt. T. G. Montgomerie, R.E., is 28,265 feet.

A direct line of glacier stretched away for some 14 miles in the direction of the fine cone of snow, K 3, and, at its base, branched to the right and left towards the Peaks K 1 and K 2. From where we stood the moraines appeared like mere threads—some could be followed up to their sources, growing finer and finer till they disappeared. Every ravine sent forth its stream of rocks, and these, though they joined one another, never commingled; then came sweeping down the expanse of ice, which was never less than 2 miles broad, in beautiful curves, and some fifteen distinct lines of different colours could be counted. Along the centre of this glacier a white line extended, consisting of huge masses of ice in detached blocks, some long and ridged, others pointed, but all in a perfectly continuous line, and which gave the idea that they had been forced up. Further down the glacier they gradually disappeared, the last mass being about a quarter of a mile from its nearest neighbour, but still in the same space, between and adjacent to the same lines of moraine. I had never before seen this feature on a glacier, nor since; nor have I read of anything like it in any of the descriptions which have been given of glacier phenomena.

Looking down on the vast mass of débris which lay below us, a few large tarns of emerald water occurred at intervals. Directly facing, and across the breadth of ice, were large tributaries from the direction of the Mustakh, having steep slopes, and consequently fissured, and broken up into huge blocks and needles of ice. Over the depression to the east of the Peak of Masherbrum, and which terminates the Atoser Glacier of the Hŭshè Valley, in Kapaloo, might be seen a few peaks on that river. Whilst the guides under

Mahomed were building up a cairn, I took a sketch of the glorious view. K 2 is a conical mass, with sides too steep to allow the snow to rest on them long; it lies, therefore, only in large patches and stripes on the fissured surface. The sketch done, and having put the highest stone on the pile, we descended to the glacier below.

Next day's camp was pitched in the deep hollow of an old lake, its high banks of débris giving extra shelter, and keeping away the cold from the ice beyond. The spot though snug, was perhaps by no means safe. I have seen such glacier-lakes full to overflowing in the evening, with the ice forming over the surface, from which on the following morning the water had disappeared, having left no record but the sheets of ice jumbled and piled about like huge panes of plate-glass. I believe that they fill thus rapidly and suddenly by the rush of waters along the numerous drains and channels which traverse the interiors of these glaciers. In the side cliffs of ice small holes were to be seen, out of which the water came pouring as out of spouts.

To those who may wish to visit this region, I would suggest that it can only be accomplished by some man of influence accompanying the party. On several occasions I saw very plainly that had it not been for Mahomed, we should have come to a dead stop: even he had great difficulty in persuading the men to proceed; but for him they would have bolted, especially at the Mustakh.

The following morning we walked as fast as we could, over the débris, and by 11·30 reached the débouchement of the Biaho River. This glacier, measured along a central line, from its termination up to Peak K 6 is 35 miles in length, but this by no means represents the length of the journey up, which was some 55 miles. The thickness of this mass of ice is about 400 feet or more, estimating it from the terminal position. In the bed of its river was an enormous transported block, standing out like a small island, whose mass defied the powers of the torrential waters, and which showed the position from which the glacier had receded. The day was beautifully clear, and from a spot some 3 miles down Peak K 2 was well seen. Towards evening we reached the first bit of jungle, where I pitched the tents.

Next day we reached a spot called Korophon; and on the morning of the 23rd I decided in following up the right bank of the Biafo as far as we could, and if possible reach some spot whence a good view could be obtained, directly along a portion of its length. This I managed to do from a low knob, some 5 miles up: the glacier was then to be seen stretching right away, up a broad valley between the mountains, at a slope of about 4° and less beyond: right away in the distance, the tops of two lofty snowy peaks could be made out. Having followed the glacier on this side till stopped by precipitous cliffs, we turned on to the ice, which was much broken and fissured; the amount of moraine was very small, and, at a short distance up, the ice became quite clear, except where along the left bank there was a long continuous line of moraine of great length, and about 500 yards in breadth. The disappearance of moraine at such a short distance from the end of the glacier greatly increases the difficulty of travelling along it. This vast and magnificent ice-stream, which I at first thought might be from 15 to 18 miles long, I now ascertained to be upwards of 40.

There is a way over the chain by this glacier of Biafo into Nagayr, which is 12 marches distant, the glacier being of very nearly equal length on either side. It was by this way that the Nagayr men used to come into the Braldoh and loot the villages; their last raid was some twenty-four years since, when a body of from 700 to 800 crossed over, and carried off about 100 men and women, together with all the cows, sheep, and goats they could collect.

The weather, which had been bad during the early part of the month, became now so much worse that I was compelled to proceed down the Braldoh to its junction with the Basha (these two rivers form the Shigar River lower down), and had to give up the plan I had formed of crossing the R'Zong La into Nagayr, and round by the Nushik La. I left Askolè in the morning of the 24th, and passed Surūngo, Tongnol, and Chongo, near which is a fine spring of hot water (temp. 104·5), with a somewhat unpleasant sulphurous smell, but perfectly clear. The water stands in a basin some 15 feet in diameter and about 3½ feet deep, on the top of a conical mound of limestone about 30 feet high. The mound is a deposit formed by the water which flows over on every side, and, as much more of this limestone was to be seen about, either the springs must have been at some time more numerous, or have shifted from one place to another. We now crossed the Braldoh to the left bank, by a rope bridge. The stretch of this bridge from the bar on one side, over which the rope passes, to the other bar, was 276 feet: it was very strongly made, but very slack, so that the descent at starting, and the ascent on the other side, were by no means easy. The ropes are made of birch-twigs—9 ropes form the footway, with 9 on either hand to hold by.

My camp this morning was near the village of Puskora, on the left bank close to another rope bridge, which we crossed on the 25th. The scenery about this spot was wild and grand, and the river, being somewhat confined, went tossing and roaring along amongst the huge blocks which strewed its course.

The path from the bridge to the Hoh Loombah was terribly bad, and even dangerous in places, from the steepness of the mountain-sides, and from the yielding materials over which it passes, which give way in great masses. We had this day several tough ascents from, and descents to, the bed of the Braldoh River, close to which, at one place and all within a mile of each other, were three hot-springs, their temperature 137°, 122°, 117° F., all sulphurous, the water issued in small quantities yet enough to make good baths if required.

On reaching Chokpojong, I started again at once, so as to reach the summit of the mountain above by evening. A fine view was thence obtained up the Hoh Loombah, with its large glacier and branches. Next day I proceeded to Dusso, and remained there till night, as the Zuks or skin-raft had not come up. On the ridge above Dusso is the holy rock of Shanasir Pir, which is an enormous round block of granite, jutting out just below the ridge, but overtopping it. The block itself is quite inaccessible, and all the people tell you so, and it is this I suppose that constitutes its sanctity; but they also add that on the top is a velvet embroidered cushion, a lump of gold, and a white spotless fowl, and that it is the residence of the Pir. The rock is held in great reverence and the people salaam to it every day; nevertheless the villagers of Dusso and Nigit are about the worst of any about here, and many a thing is laid to the account of the Shanasir Pir, which may be well accounted for otherwise. Thus any small article which might be missing in the morning, was gravely said to be a miraculous disappearance by his intervention. The skin-raft arrived in the course of the night, and the next morning we went down to the river and embarked. The men expected that we should reach the opposite bank near a large rock; but though they exerted themselves to the utmost, we soon saw that this was quite impossible, and we were swept past it some 50 yards distant, and went down the river at a mad pace, causing that curious feeling of excitement which a sense of some coming danger always produces; nor were we long kept in suspense. The boatmen or rather raft-men behaved with great coolness, and steered safely close to the edge of a bank of boulders which lay on the right; we passed also some ugly waves beneath the cliff on the other side. Thus we went along all right for about half a mile. Nothing could be seen ahead but white curling waves and foam, with great black rocks here and there: into the midst of this our raft glided. Mahomed and the manjis repeated the Kulmah or Mahomedan Creed in a rapid whisper, as we were carried over the crests and down again into the troughs between the curling waves. At one time I did not expect that we should come out of them; for whilst in the trough a great wave broke right over our frail raft, and completely buried us. I held on, but for several seconds did not know whether some of my people had not been swept off. For a moment we came to the surface, the manji shouted, "Ya Ali, hold tight!" and in another moment another great wave came down upon us. When at last we came out upon the smooth water below, and looked back up the rapid we had just come down, every one breathed freely again, and the "Thank God" of each was never more sincerely uttered. The manjis salaamed low to Pir Shanasir, to whom they said they owed their lives. Wet through and shivering with cold we walked on briskly to the village of Tandoro on the Shigar River, near which place we had to cross preparatory to a trip up the Basha branch.

Before taking leave of the Braldoh something more as to its trackways may not be out of place. The principal exit from its valley is that to Yarkund over the Mustakh. According to the reports given me, the glacier on the northern side is as long as that on the southern, but in my opinion the journey would be longer, as I do not think that the way lies down its main stream, but that the main body of the ice would be towards the great Peak K 2, with another from the Peaks of Nobŭndi Sobŭndi. About four marches from the Mustakh Pass a track branches off to the westward, up a lateral stream, and over a ridge to the Hūnzè river, by which the Braldoh people have often gone, as being safer than by Nagayr, with the people of which district there are old feuds. It is by this way, at the back of the main Himalayan ranges, that the Hūnzè people, and other robber tribes on that side, proceed when they rob the kafilahs, or bodies of merchants and other travellers, so that this route is now discontinued as a line for commerce, and is only taken by a few Baltis who have settled in Yarkund, and who cross over now and then to see their old friends.

Many years ago the main traffic lay up the Baltoro Glacier, and turned off up a lateral ravine to the left, and so over the Mustakh, some 12 miles, to the east of the pass now in use. This former pass became impracticable owing to the great increase of snow and ice, and Ahmed Shah ordered a search to be made for some other way over, when the present passage was fixed upon. Leaving out of consideration the tracks near the villages and towards the end of Punmah Glacier, the way along its side and across it might, with a little labour, be made practicable for ponies. Even were there more foot-traffic during the summer months than at present, it might be worth while to see to the more difficult places, but at present this line is wholly disused for a month at a time. The few travellers that go this way do not know the places where the deep fissures lie, and hence there is great loss of time in wandering about in search of a proper direction. The ascent over this pass is very gradual the whole way; ponies and yaks have frequently been brought over from Yarkund. The line from Skardo to Yarkund joins that from Leh in Ladak, near Mazzar.

One of the most curious and suggestive features to be observed in the Braldoh valley is connected with the great glacier of Biafo. Crossing the transverse valley into which it descends with its vast mass of ice, and abutting on the cliffs on the opposite side, it forces the river to flow at the foot of these, though in some places it is completely hidden, coming into view only here and there. This relative position of the Biafo Glacier to the Braldoh valley produced many years ago—how many I could not ascertain—one of those cataclysms to which the Upper Indus is subject. The valley of the Braldoh became wholly obstructed with ice, and the whole of the broad expanse above of sandbanks and lines of streams became converted into a deep lake, which extended several miles upwards. Thus it continued for some time, and when the waters at last broke through their icy barrier, the damage done seems to have been considerable. The greatest flood chronicled in the traditions of this region is that which took place along this very tributary to the Indus some 200 years since, when the village of Spanboo was quite destroyed, and its Musjid carried almost entire into the Shigar River. This was considered to be a miracle, and its timbers were accordingly re-erected in one of the villages on the left bank, where they remain to this day.

The grazing-grounds of the villages of the right bank of the Braldoh lie up the Thla Brok and neighbouring ravines; those of Askolè are immediately above the village, whilst the villagers further down have to take their herds and yaks up the spur above the camping spots of Tsok and Punmah. The goats of this valley are very handsome, with fine curling horns like those of the Markore.

The villagers of these regions have but few personal wants, and all are obtainable in the valley. They dress entirely in puttoo, or woollen cloth, which they make themselves: cotton is never used, not even for turbans. Their knowledge of the world is almost limited to their own wild ravines, and though many may have crossed the Mustakh, I met with very few who, in the other direction, had been beyond Skardo. During the winter months the men are engaged in hunting the Ibex, when these are driven off the higher ground by the snow and come down to the streams. The animals are run down by dogs, which they take great care of and prize highly. The dogs are trained to get above the Ibex, and so drive them to spots below, where the men are ready with their matchlocks. The Ibex seems to have the greatest fear of the dogs, and, instead of bounding away, will run and then crouch behind rocks on their approach, but taking little heed of the men. In several places I came upon the small, strongly-built huts, where the people place the venison, which freezes and keeps till they return to the village below. About Askolè were fine crops of wheat, beardless tromber, and turnips. Peas are sown at the same time with the wheat. At the time of my visit they were green. Hay is made towards the end of August, and is put up in large cocks on all the large blocks about, whilst all the house-tops are covered in like manner. The fodder is excellent, containing a good deal of lucern.

I now proceeded to survey the Basha branch of the Shigar River. The skin-raft from Shigar being still in camp and the manjis (boatmen) having found a good place for crossing the river, opposite the village of Yūno, I left Tandoro on the 28th of August, and landed safely at the village of Kaiyu, in Goobalpur. The villages passed on the right bank of the Shigar are well irrigated from the small glaciers of the second order, which lie on the ridges about the Peak B 21. They are also well wooded, the walnut-trees especially being very fine.

Next morning the Mountain of Koser Gunge, opposite to us, formed a beautiful sight from its fresh whitewashing. Rain with wind kept sweeping in heavy storms down the Basha River during the day; but we managed by evening to reach Chūtrun, passing on our way over a very difficult piece of ground near the village of Tsogo by means of ladders and planks. A recent inundation had wrought great changes about the village of Tisir, having destroyed all the cultivation near the stream, which now lay buried beneath sand and detritus, with blocks of large size. Some eight or ten houses had also been completely covered, and large trees had been torn away by their roots. The villagers said that it had been caused by the bursting of a glacier lake that took place in the month of July: part of the village of Koshūmūl, on the left bank of this same river, had also been swept away, owing to an unusually wet season, causing "shwās" in the ravines. I was glad to find that some improvements had been made near the hot spring at this place (Chūtrun), and that a neat little bungalow had been built for the use of the visitors. The hot spring here (temperature 110° Fahr.), gives the name to the village, from "chu," water, and "trun," hot. The water is as clear as crystal, and without any taste or smell. The valley from Chūtrun upwards towards Arundu, in respect of its picturesque beauty, may be said to surpass everything on this side Skardo, ending off as it does in the glorious glacier of the Chogo Loombah. The villages are well wooded, standing on the lower slopes amidst groups of fine walnut-trees. A kind of arbele poplar also grows here, but the apricot does not thrive; and though apples and pears ripen, they are of inferior kinds. The whole of the road to Arundu is excellent travelling. This adds greatly to the inducements which this valley offers to visitors, and it is well worth visiting by all such as may reach Skardo.

It was necessary to fix some point well at the angle where the Basha River valley, turning from due north and south, takes a course west to Arundu, and so shuts out all the trigonometrical points in the Shigar River. I left Doko very early, and, after climbing a succession of grassy spurs, reached, at 3 P.M., the edge of a glacier of the second order, some 1500 feet above which a rocky slope extended, ending in a jagged ridge of bare rock. We crossed the glacier, and commenced the ascent, reaching the summit in about an hour. Much as I had been accustomed to the grand features of these regions, I do not remember that I ever experienced a feeling of astonishment so great as when I saw the view which here presented itself. For my survey work no point could be better; higher it was scarcely possible to proceed along the ridge to the south-west. Of the scene itself I can only venture to indicate the component elements. To the north-west there was the great glacier of the Basha, with the little village of Arundu at its termination, its fields touching the ice. On the west there was Peak B 14, or Haramosh, with its fine summit of eternal snow towering above all the minor cones, and from which the lateral feeders in that direction were evidently derived. But the Nūshik La and its glaciers were not visible, being shut out by the great intervening mass of ridges, and spurs, and glaciers.

Next day, after having been benighted on the mountain slopes, where we passed a supperless and a sleepless night, we started again for Arundu. I was much struck with this place, there is so much that is novel and curious, even to a mountain traveller. Not the least of these is to see agriculture going on close up to a glacier of so large a size. The remainder of our day here was employed in preparations for our trip to the Nūshik La, or Pass, from this valley into Nagayr.

On the 3rd of September the weather was again beautifully fine, and I started at 10 A.M. We had to proceed up the right bank of the glacier for about half a mile in order to cross it, and so enter the valley of the Kèro Loombah, which here joins the Basha from the north. This crossed, the track lay up the right flank of the Kèro Loombah, and for 4 miles, as far as the glacier of Niaro, was wretchedly bad. From the opposite moraine, after crossing the glacier, a curious scene presented itself. As the glacier abuts against the cliffs of the left bank of the Kèro Loombah River, it had, when much larger than it now is, so completely stopped the waters of this river as to form a large lake. This happened some ten years since. Before the formation of the lake, a wood of birch-trees, some of large size, covered the valley, and these, when it became filled with water, had all been killed; and there they now stood, with all their gaunt white stems, which, taken with the other features around, made up as desolate a scene as can be well imagined. A few willows were beginning to shoot up again, whilst the bottom of the old lake was grown over with a high jungle of rank grass. The size of this lake was about 2 miles long, by half a mile broad. From the line of the destroyed trees it was 200 feet deep. This line was well marked by the birch-trees growing along the hill-side, which were on a level with the moraine of the Niaro glacier. The lake continued as such for rather more than a year and a half, and, fortunately for those below, it subsided gradually, having taken about a month to discharge itself. Here I pitched our camp, and on the next morning (the 4th) we proceeded to the foot of the Kèro Loombah, the walking being generally over plateaux of high grass, birch growing in plenty on the mountain-sides. Traces of bears were frequent, but we did not come upon the animals. As we skirted the glacier, evident signs that it was now on the increase were constantly to be seen in the masses of upturned and broken turf.

About 1½ mile further up, a lateral glacier descended from amongst the mountains to the west, and the spur bounding it to the north being practicable, I determined to fix the position. I ascended till the snowy peaks Trans-Indus 2 and Trans-Indus 4 could be seen above the bounding range of the Kèro glacier on the north, while Trans-Indus 11 to the south-east gave me my position very correctly.

The Kèro Ganse here divides into two, that to the W.N.W. leading up to the pass; that to the E.N.E., of equal length, descends from the mountains, which also bound the Hoh Loombah of the Braldoh valley, but which are quite impassable. Other smaller ice-streams from the peaks of the intervening ridge give each its quantum to this branch.

I descended, and accomplished 2 miles more up the main glacier that day, encamping at a spot known as Kŭtchè Brausa, on the edge of a little green tarn of water. Next morning we crossed the glacier for 4 miles, diagonally, to the left bank, and left it at a place known as Ding Brausa. Ascending some 300 feet above it we crossed over a spur, and then took to the ice again, where a lateral glacier from the north descends into the main valley. The ice here is much fissured, and at some seasons very dangerous. It continued bad to Stiakboo Brausa ("Brausa" means "place"), where, on a small spot of bare ground, two small conical huts, or rather kennels (for they are only 3 feet high), have been built for travellers who may be caught in snow-storms on their way over the pass. The narrow strip of moraine here disappears. From this we ascended in order to avoid the deep fissures below, and cut steps, for a distance of 200 yards, along the steep slope of the snow-bed, which runs down into the glacier. Beyond this, on turning due north, the pass of the Nūshik came in sight, up a gradually sloping ice-bed with scarcely a single crevasse, steep cliffs enclosing it on either side. Several of the men felt the height, and had to remain behind from sickness and headache. I scarcely felt it; and I think that the state of the stomach has a great deal to do with these sensations.

The view from this point was superb down upon the enormous glacier below; whilst beyond were the fine snow-peaks of Trans-Indus 2 and 4, sending off large tributary glaciers 10 to 12 miles long. To the east, the view lay along the glacier, which was visible for 18 miles. On the north was one great elevated ice-plain, and the peaks bounding the Nobŭndi Sobŭndi glacier. The breadth of the main glacier was more than 2 miles, covered with broad moraines of black, white, red, and grey rocks, according to the tributary ice-streams it takes up in its course. No glacier scene in the whole of the Himalayas can exceed this in the magnitude of all its features. To the westward, the view was shut out by the spurs from the mountain, but the natives with me said that the glacier terminated two days' journey distant, at Hisper, in Nagayr. The descent from the pass to the level ice below is about 3000 feet, and difficult as well as dangerous, being down steep slopes of ice and rock; so that it is necessary to let a man down, with a rope round his waist, to cut places for the feet. After finishing my work we retraced our steps, and at nightfall on the same day got back to the encampment, having successfully surveyed the northern watershed of the Basha Braldoh.

On the 5th of August I started early, and reached Arundu by noon. The next day, at 12 o'clock, I crossed the glacier, as before, to the left bank, and, ascending on that side by the skirts of the Chogo Loombah glacier, reached in the evening the edge of a small glacier lake, about a quarter of a mile square, called Bŭkpon Tso. These lakes were numerous, and formed a long linear series. They have a desolate look, from the many buried trees (willow and juniper) standing out of the water, mostly dead, the remainder struggling for life in the icy water. Some lakes were covered with masses of ice which had broken away from the glacier cliff. The waters were tenanted by flocks of ducks, but they kept out of gun-shot.

We began the 8th by a long ascent up a spur, starting early, but all to no purpose; other spurs beyond shut out the view. So we descended again, and proceeded up the side of the glacier, sometimes walking on the ice, and sometimes on the hill-side. The surface of the ice was more uneven and broken than I had yet seen in these large glaciers, being, in fact, a sea of frozen waves as far as the eye could reach. The small lakes still continued wherever a lateral stream joined the glacier, thus making a barrier to its waters. The appearance of the glacier continued the same the whole way up, with less débris on one side than on the other, but much fissured. The slopes were covered with grass, and near the glacier was plenty of willow and juniper, forming little woods at the junctions of the streams. The tracks of bears were to be seen in every direction in the sand and mud in the hollows between the glacier and the mountain-side, but they were probably at this time high up among the ravines.

Next day (Sept. 9) we crossed a large glacier from the north, 1½ mile beyond which, the hill being accessible, I ascended some 2000 feet to a fine knob. But the clouds prevented my doing any good work. It was quite dark when we reached the level of the glacier in the evening, and finding our camp men were not there, had to bivouac out.

The bounding ridge had been fixed by the previous day's ascent, and with the exception of a few lateral ravines and glaciers on the left bank, the survey of the whole of the Basha valley was now complete; so after a more detailed examination of the left bank of the glacier we returned to Arundu under a drenching rain. I made halt the next day, and the morning of the 12th saw our camp struck. It was a lovely day, and our path lay down the left bank and over the level sands below Arundu, afterwards along the hill-sides to the pretty village of Doko.

The whole of the valley drained by the Shigar River was now surveyed, presenting on the plane-table as curious and wonderful a map as can be well imagined. The district may be described as one great area of ice-bound mountains, with long trains of ice debouching out into the drainage lines. The Glacier of Biafo forms the striking feature of this region. The average slope of this glacier is about 3·5° to 4°. I found that the slopes of these glaciers seldom attained 5°, and 3·4° may be taken as the medium. On the Chogo Loombah glacier, the ribboned structure is best seen, though it is visible in all; these bands of coloured ice run continuously with the glacier in its length, and cross sections show them dipping towards the centre. On the sides of the glacier this slope was frequently from 32° to 40°, and increased towards the centre, where the bands were almost, if not quite, perpendicular.

The present thickness of the ice is a point not easily determined; but, judging from striæ in the sides of ravines from which glaciers have retired, from 300 to 400 feet is not an exaggerated allowance for what they once have been. I am inclined to think that it may have been more for parts nearer the river. The ice of these glaciers is many feet higher in the centre than on the sides; it also differs considerably in texture.

Whilst engaged in the work described in the preceding pages, I have often been struck by the indications of considerable amounts of change of temperature within what we may call our own times. The proofs of this are to be found in many parts of the great Himalayan chain. These consist in the enormous terminal moraines which in so many places abut on the larger rivers, down to which point glaciers must once have descended, and which in some cases must have rivalled in length the present ones of the Mustakh Range. If other evidence be required as to these older glaciers, it is to be seen in the long furrows cut out of the solid rock as if with a chisel wielded by a gigantic hand, but more neatly than any chisel would leave its work. Nowhere are these great striations better seen than in the Shigar Loombah, the ravine from Thyarlung on the right bank, some 3 miles up, where the hard slates have been ground into rounded bosses, and streaked in the line of the ravine.

Among the proofs that there has been a change of temperature of recent date are the following. Many Passes which were used even in the time of Rajah Ahmed, Shah of Skardo, are now closed. The road to Yarkund over the Baltoro glacier which before his time was known as the Mustakh, has by the increase of the ice near the pass become quite impracticable. The men of the Braldoh valley were accordingly ordered to search for another route, which they found in the present pass, at the head of the Punmah glacier above Chiring.

Again, the Jusserpo La can now be crossed only on foot; whereas in former times ponies could be taken over it. The pass at the head of the Hoh Loombah is now never used, though there is a tradition that it was once a pass; no one, however, of the present generation that I could hear of had ever crossed it. Certain large glaciers have advanced, such as that at Arundu, of which the old men assured me that in their young days the terminal cliff was 1½ mile distant from the village. Mr. Vigne says, "it was a considerable distance," it is now only about 400 yards. A like increase has taken place at Punmah, where within the last six years the old road has been completely covered by the ice and moraine, and where Mahomed, my guide, told me the old camping ground was, now lies a quarter of a mile under the ice: the overthrown trees and bushes plainly testified to the recent advance which this mass had made; this evidence was equally well seen along the side of the Arundu glacier.

Even so lately as twelve years since, the people of Shigar were enabled to get two crops off their fields; thus the first crop (barley), was followed as soon as cut by a second (kungŭni) which ripened by the end of autumn. Since that time it will not come to maturity, so that after the barley the fields now lie fallow, and the kungŭni has now to be sown earlier in the season.

It was now time for returning to Kashmir, our route being through Punzul to the Alumpi La, and our party had to be divided, owing to the difficulties of the road. The first day I reached the small summer huts of the shepherds, called Matuntoro Klas. I was much surprised to meet with a few scattered trees of *Pinus excelsa*, but heard that they were also to be found in most of the shady ravines of the watershed between the Indus and Shigar rivers. I here lost three days owing to the badness of the weather, and on the morning of the 18th marched by a zigzag course up a steep slope to the pass, from the top of which there is a fine view of the mountains towards the Braldoh; the Karakorām in the extreme distance overtopping all. Trans-Indus 2, opposite, looked very fine. The last few days rain had given all the higher peaks fresh coatings of snow. Very little could be seen to the south or west, so shut in were we on those sides by high spurs. A good but steep descent took us down to Pakora Klas (klas is a summer hut). Our way thence was through a narrow gorge of limestone (the bedding on either side being quite perpendicular), and, following the left bank of a small stream, we reached the first village (Hŭrimŭl) on the Tormik River, a considerable body of water coming from the westward, flowing through a cultivated, fairly wooded, and cheerful valley, with grassy spurs running down into it from the mountains above. I followed the left bank of the Tormik, crossing several small tributary streams joining it from the north. The villagers all along were busy cutting grass, or wheat, or threshing it out with bullocks: it was a cheerful and lively scene, which I appreciated the more from the bleak and wild features amongst which I had of late lived.

The next morning looked unpromising for alpine work. I started, however, hoping to make the passage of the Stok La, which I was anxious to cross. Our way lay along the left bank of the Tormik, and was good and grassy. Near the first large ravine from the north, called Tserbrum, there was a hot spring like that of Chūtrun, clear, tasteless, and without smell. Its temperature was only 98°. On reaching the foot of the pass, clouds and snow compelled me to return. The Tormik River has its sources in several small glaciers, and as the survey of the valley was complete, there was no necessity for remaining. We reached towards evening the small but prettily-wooded village of Kŭshipa, down the Tormik valley.

On the 20th I proceeded towards the junction of the Tormik with the Indus. We were obliged to camp on the ascent in the midst of falling snow, and the next morning mounted the remaining portion, before the sun rose from behind the mountains to the north of the Indus. On gaining the highest point there was a glorious view of the peaks covered with fresh snow. To the southward, and up the Indus towards Skardo, fine grazing ground lay beneath us, and some hundreds of sheep were seen coming up from the klas below. It was a long and tiring descent to the Indus. We reached the rope-bridge at Mendi by 3 P.M., the longest and best specimen of these bridges which I had seen, being swung quite 150 yards above the river, from the face of a sheer cliff on the right bank. Its length was 110 feet, the path down to it was well made of spars and beams overlaid with flat stones, with a few ladders here and there. The bridge, with the river below flowing smoothly along between its precipitous cliffs of rock, and the foot of Mendi beyond, altogether formed a striking subject for the artist. On the opposite side I was met by the Dogra Thanadar, and the Balti Rajah, with whom I walked into the village of Mendi Khur. It is an odd-looking place, built on the banks of a large stream flowing from the snowy range between Ronyul and Astore. This has cut itself a deep and narrow gorge through the granite rock, which is spanned by a good wooden bridge. The houses are built amongst the rocks on either bank, and aqueducts of hollowed trees are carried in every direction along the face of the cliffs and across the gorge, conveying water to the houses as well as the gardens.

On the 22nd we started early in the direction of Skardo, along the left bank of the Indus—part of the road lying along the slippery faces of the cliffs, and very dangerous. We camped under some overhanging rocks opposite the village of Byicha, which sent a deafening echo back from the river, roaring past close by. About a mile and a half further on, after leaving camp next morning, we reached another bad part of the road. It was of exactly the same kind as that we had passed the day before, consisting of a series of ladders placed against the nearly perpendicular face of the cliffs; but the ladders were more dangerously placed, and some of them very rickety. This route should not be attempted by any one liable to get dizzy on looking down from great heights. The ladders often rested only against pieces of wood driven into cracks in the rocks, and on looking through the rungs as you go up, the view presented is that of a great river rushing along like a foaming torrent, at the base of vertical cliffs, which descend 300 feet sheer beneath one's feet.

After reaching the top of the last ladder the path enters a deep cleft in the rock, which for several yards is quite dark. Climbing up two or three more ladders in this, we at last emerged into the light, again to descend upon the river. Our path now continued good for three miles, running close to the river: we then reached the foot of a steep face of rock, the river flowing sluggishly at its base. Our guide here informed us that we must strip and wade. The water was dreadfully cold and reached up to my armpits.

We then scrambled up the cliffs to regain the pathway; thenceforward the road was good all the way to Krabathang and Basho, the road to which branches off at the former place, ascending over the very high spur, called the Kutchi Bore La, the camping-spot being on the summit. Between this pass and Mendi Khur the mountains of the south bank begin to be more wooded. *Pinus excelsa*, the tall silver-fir, and birch, are seen in dense patches wherever the slope admits of their growth.

The camp being pitched at Basho, I ascended a low spur above the village to get a view of the large stream which here joins the Indus. Glacier action of former times, was here very apparent in the great masses of angular rocks above the village: the stream comes rushing down over these for about a mile and a half above it, winding down a gently sloping valley, with high mountains on either side. This enormous collection of angular rocks is the terminal moraine of a large glacier, the remains of which are to be sought higher up, and where now it is only some four or five miles long, with broad feeders from the mountains on the west side.

On the 24th we still followed the left bank upwards, as far as Kutzurah. There is very curious ground near Kutzurah, which is situated at the western end of the Skardo Basin, where the Indus begins to flow through a confined channel: the features which attract attention are low undulating rounded hills, composed entirely of angular rocks, but no surface-earth whatever nor sand. In the midst of these and close to the village is a pretty green lake, about 600 yards long by 250 broad, of beautiful clear water, from which the mountains around are reflected as from a mirror: its stillness is only broken by the occasional rise of some fish. This lake is called the Forok Tso.

The country around Kutzurah is well wooded and clothed with verdure. We now left the Indus valley to proceed up a large tributary which it receives from the south. Two miles above the village we entered a level valley, about half a mile broad, between steep mountains, the river flowing through it in a succession of deep pools and winding reaches. At the end of this valley is the small village of Tsok, beyond which the valley narrowed to 200 or 300 yards, and was dotted with large clumps of willow-trees, the stream flowing in four or five channels. On the following day (25th) our march still lay up the valley: the level bit soon ended, and two miles further the waters of the stream came roaring down over and among the large angular blocks of an ancient moraine. As we ascended, the hills became better wooded, and the cher (*P. excelsa*) here was of tall growth. About 9 A.M. we reached the village of Stokchŭn, and by noon arrived at Shigarthang, a wild dreary-looking place, at the junction of three large streams—the Dora Loombah from the direction of the Boorje La, the Munder Loombah and the Alumpi Loombah. Close to the village are two substantial guard-towers, built at the time when the various rajahs of Baltistan were at war with each other.

Shigarthang, standing on a plateau at the junction of four valleys, gets every wind that blows, and in winter is dreadfully cold, its elevation being 10,200 feet. The sheep of the district are remarkably fine. From this place towards the Alumpi La the valley is open, grassy, and nearly level: the banks of the stream are fringed with willows, and junipers stand scattered about over the lower slopes of the mountain. About 3½ miles further on is the junction with a stream from the R'Bunnoch La, distant some six miles; one of the roads to Astore over a small but crevassed glacier. On the 27th we ascended the pass of Alumpi La, where we came upon the skeletons of several men which lay bleaching on the rocks, the remains of some unfortunate coolies who had been overtaken by snow-storms and had been frozen to death. Half-way up the ascent, in a small hollow, was a deep and beautifully clear tarn of water: three more skeletons lay here, their loads on the ground beside them, one being still fastened to its bearer. These spectacles were not very cheering to our party, for they could not fail to remind one that the same fate must happen to ourselves should a snow-storm come on—for it would be impossible to advance or return over such ground as we were now on. Another steep bit of rather more than 1000 feet above the tarn brought us to the pass, where more bones and rags, and broken kiltahs told the dismal tale of many a man's last hours of suffering, in his unsuccessful fight with the elements. Fifty men had perished here —coolies proceeding from Kapaloo to Gilgit with supplies.

By this time the day had suddenly changed: huge rounded masses of cloud were rolling up over the Deosai plains, and all the high peaks were hid. The Nanga Purbet, which I had hoped to see in all its beauty and grandeur across the valley of Astore, was quite obscured. I found the level of the pass by boiling thermometer to be 15,200 feet. We left this desolate spot as fast as we could, for the clouds were gathering and becoming very threatening: fortunately we cleared the zone of angular débris before the snow began to fall. The wind was gusty, very strong, and cuttingly cold the whole way to Boobin, a small place of three huts, the first habitation on the Astore side. I found the people here very different from those of the other side; the language even had changed, though the Balti predominated in it. And now, when my steps were bent towards Kashmir, I seemed to feel that for the present I had had enough of ice-fields and glaciers. The field-work for the season was at an end.

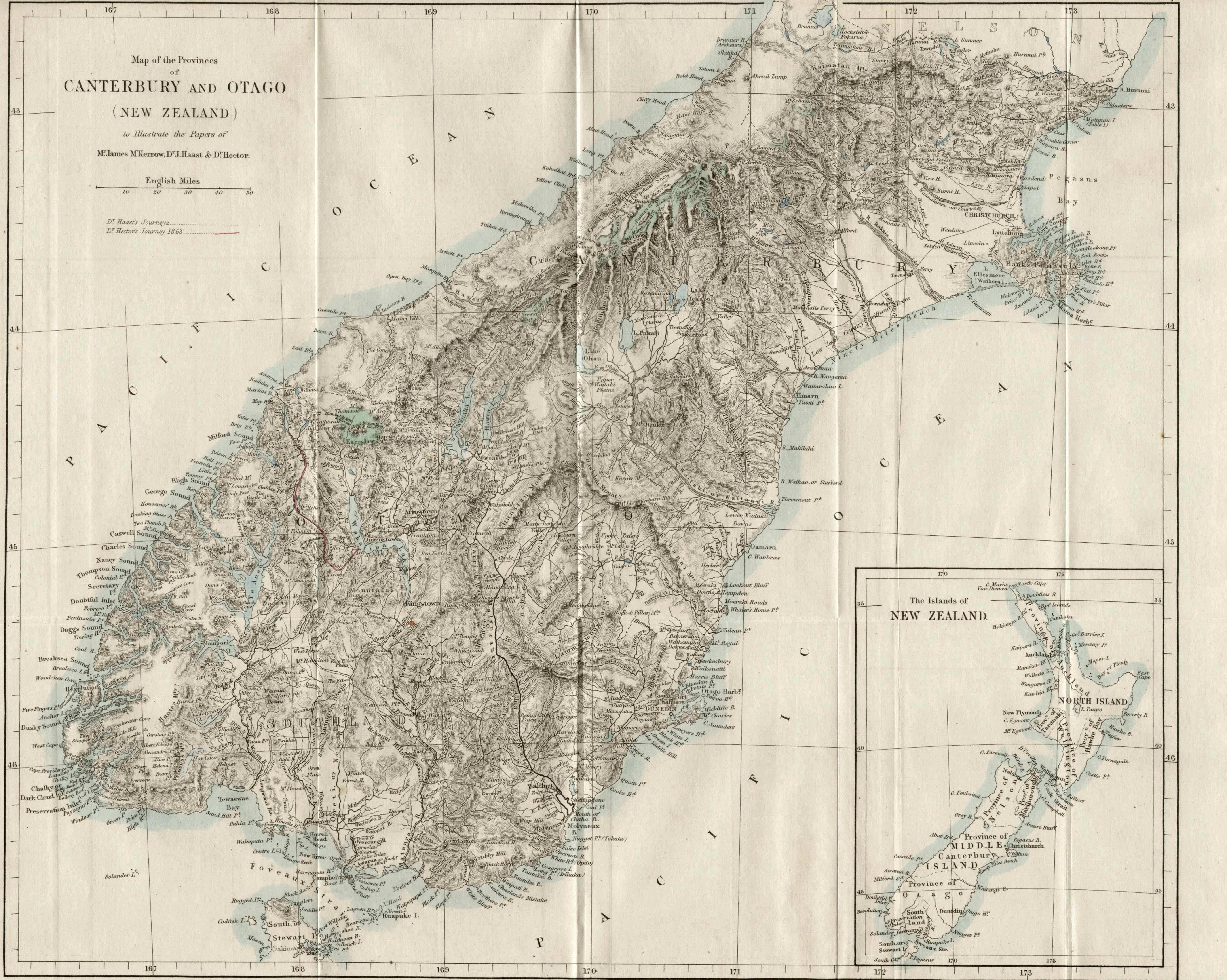
The valleys of Astore resemble those of Kashmir rather than those of the other side: they are broad and open, and are bounded by forest-clothed hills of pines, the streams flowing along quietly. The Dorè La will be found the best pass into the valley of the Kishen-Gunga. The ascent is gentle and open, and the road excellent the whole way into Kashmir, crossing the Raj Diangan Pass to descend on the Wuller Lake near Bunderpur.

IV.—*Reconnaissance Survey of the Lake Districts of Otago and Southland, New Zealand.* By JAMES M'KERROW, Esq., District Surveyor to the Province of Otago.*

Read, January 25, 1864.

Mountains and Lakes.—The most marked and striking feature in the configuration of the country now under consideration, is the great and sudden differences of elevation that diversify its surface; the elevations take the form of mountain ridges, and the depressions that of gorges, valleys, and deep rocky basins, the latter filled by lakes. The mountains rise from 4000 to 9000 feet above the sea-level; and as the line of perpetual congelation is 8000 feet above the sea-level (as determined last year from the reconnaissance survey of the Wanaka and Hawea Lake district), it follows that all elevations greater than 8000 feet are within the glacier-producing zone. The highest parts of the Forbes and Humboldt Mountains are within this zone, and are covered with ice; they are parts of the great icefields that congregate around Mount Aspiring as a centre. The Earnslaw glacier, although only covering about a square mile in extent, is still, on account of its position, a very imposing object; it lies on the south side of Earnslaw, at an elevation of from 9000 feet down to the melting point; it is 15 miles north by east of the head of the Wakatipu Lake; and, as seen from any part of the most northerly 20 miles of it, is by far the most attractive object in view. The lie of the country is nearly from north to south; and while the mountain ridges individually range in that direction, they may, when taken in the mass, be more correctly described as lying from N.N.E. to S.S.W., and that being directly athwart the track of the almost constant winds from the Pacific Ocean, their influence on the climate of the country may be considered as of the highest importance; for not only do they break the force of these winds, but their cool tops condense the vapours into showers that might otherwise pass over so narrow an island without parting with a drop. The height of the ridges causes the downfall on them to take the form of snow, which lies on them during the greater part of the year; this circumstance,

* The original Report appeared in the 'Otago Provincial Government Gazette,' Oct. 14, 1863.


Map of the Provinces of
CANTERBURY AND OTAGO
(NEW ZEALAND)
to Illustrate the Papers of
Mr. James M'Kerrow, Dr. J. Haast & Dr. Hector.
English Miles
10 20 30 40 50
Dr. Haast's Journeys
Dr. Hector's Journey 1863
PACIFIC OCEAN
CANTERBURY
OTAGO
SOUTHLAND
NELSON
CHRISTCHURCH
DUNEDIN
Pegasus Bay
Banks Peninsula
Foveaux Strait
The Islands of
NEW ZEALAND
NORTH ISLAND
MIDDLE ISLAND

by accumulating, over long periods, what would otherwise run off in streams as it fell, is the prime cause of the great, sudden, and, at first sight, apparently inexplicable floods that characterise all the rivers that have their sources in high mountains. Change of temperature is the secondary and immediate cause; but although this is the case, a flood may occur without any great or perceptible increase of temperature, for the wind, by transporting the snow to a lower altitude, occasions the same effect as a rise of temperature. It was noticed, during the survey, that the snow-line on the north-west side (the windy side) of the mountain ridges was higher than on the south-east side (the sheltered side), thus showing that the wind is a very decided cause in producing the effects now under consideration. The flood-marks on the mountain streams, more especially those running into the Te Anau and Manipori Lakes, show a rise and fall almost incredible. The power exercised by such torrents is forcibly impressed on the attention by an examination of their channels, where immense blocks, that have in the first place been disintegrated from the surrounding mountains by frost, are seen lying and being broken up, through the never-ceasing attrition of rushing waters, into shingle and sand, which are carried forward and deposited in the lakes. The mouths of the rivers all show that they are advancing into the lakes, however slowly that may be. The lakes are a very great feature in the natural history of the country, and perform a most important function in its economy. They act as regulating reservoirs to the mountain torrents already mentioned; for over their broad surface the floods find room to spread their volume, until there be time given for the accumulation to pass away in the steady flow of one river. The value of the lakes as a means of restraining such rivers as the Clutha and Waiau within safe limits, will more readily appear when it is considered that the Te Anau and Manipori Lakes (the two principal of the Waiau River system) alone cover 182 square miles, and that their surfaces have a rise and fall of 8 or 9 feet during the course of the year. The Clutha River, likewise, has the Wakatipu, 114 square miles; the Wanaka, 75 square miles; and the Hawea, 48 square miles: altogether, 237 square miles of lake to regulate its volume. These lakes have also a rise and fall of several feet. From the data now given, it will be evident that but for the tempering influences of the lakes, the Clutha and Waiau, in place of flowing along a well-defined channel, in a perennial stream as now, would have been so fluctuating in volume that no channel could have contained them, and their valleys would have been long shingle-beds down to the sea—a continuation, in fact, on a grand scale, of such valleys as those of the Dart and Matukituki.

The greater extent of the lakes at a former period is evident from the terraces that surround their present boundaries; it is plain that the Wakatipu Lake must have extended formerly over the low fertile tract of country that extends east from Frankton to the Crown Ridge. The summits of Peninsula Hill, Morven Hill, and perhaps some of the lesser elevations, would then be islets. The old channel of a large river, leading away from the south end of the lake, at Kingstown, is very suggestive that then the overflow of the lake passed away by it, and down the Mataura to the sea. An examination of the valley in which this old channel lies, does not readily explain the cause of this rearrangement in nature, for no sudden upheaval has there dammed the waters of the lake back from their ancient exit; the old channel remains as distinct and as well defined as though the change had only been a thing of a few years. The waters of the lake have receded rather more than a mile in distance, and left the old channel high and dry. The very abrupt gorge through which the Kawarau (the present outlet of the lake) flows, suggests that the change has been brought about by the sudden erupting force of an earthquake opening a pass through the mountains lower than the level of the then lake; and that the present deep gutter-like channel of the Kawarau has been the subsequent slow and gradual wearing down of the channel by the rapid current that sweeps along it.

The depth of the lakes is an interesting consideration in connexion with them. I had not the means of determining it; but that their depth may be reckoned by hundreds of feet, I have almost no doubt. On leaving the shore, at the distance of a boat length or two, the bottom may be seen through the clear water at a depth of 20 or 30 feet; but there is then very often a sudden dip, and there begins the deep blue water through which the eye can no more penetrate. Up the Fiords of the Te Anau and Manipori Lakes there are many places where there is no beach at all; the rocks rise perpendicularly out of the water for hundreds of feet, so that it may be said there is a precipice above and a precipice below the surface of the water. If the waters of the lakes were suddenly to dry up, the present shore-line would, I believe, appear in most places as a mere ledge on the face of a precipice. On the Wakatipu Lake, one of Mr. Rees' boatmen tried the depth of the lake near Queenstown: by means of a weight attached to the end of a rope, 200 fathoms of line were let out before reaching what was considered to be the bottom; similarly, on the Wanaka Lake, 70 fathoms were let out. These results, although they cannot be relied on as precise, are of value as showing how very deep the lakes must be. Soundings of the lakes, carefully taken with deep-sea sounding apparatus, would aid in the solution of the problem—"By what means were the lakes produced?"

The recent development of inland navigation has directed attention to the fickle and uncertain winds that prevail on the lakes. This phenomenon is accounted for on the principle in pneumatics that underlies the explanation of all motions in the atmosphere, viz., the tendency of cold air to supply the place of the warmer and more rarefied. The secondary causes are the unequal radiating powers of land and water, and more especially, in this case, in the very unequal and mountainous surface of the country surrounding the lakes; the cold mountain air descends into the gullies, and they all open into the lakes. Then, again, they lie in different directions, and so receive the heat of the sun at different times of the day. The consequence of these varied influences at work is a condition of unstable equilibrium in the atmosphere, which, when intensified by a strong north-west wind (the prevailing wind) raises a sea on the lakes that—confined within their narrow limits and broken on many headlands and islands—becomes for the time a tumultuous assemblage of waters, against which it is in vain for human effort to contend. The action of the winds on the Te Anau Lake, from its greater size and diversity of shape, is more interesting than on any of the other lakes. On it there is sometimes both a storm and a calm at the same time. Sometimes it will blow down the lake, and at the same time be calm up the fiords, or *vice versâ*. When such is the case, there is a sort of heaving motion over the calm part. During warm settled weather the phenomenon of "land and sea-breeze," so grateful in warm countries, prevails on the lakes. On the Te Anau Lake, where, on account of the large extent of downs on its east side, the radiation is more regular than that which arises from the surroundings of some of the other lakes, this alternating breeze during the intervals it operated was seen to be so regular, morning and evening, that it became almost a measure of time; and from the tidal effects that the breeze had on the Te Anau, it seemed to confer on it the attributes of a sea.

Rivers.—The two principal rivers of the country surveyed are the Waiau and Kawarau; these, together with the Upper Oreti and Wakaia, represent the drainage of the country. The Waiau issues from the Te Anau Lake, and after a very rapid sinuous course of 10 miles, it enters the Manipori Lake at a distance of 5½ miles in a direct line from its exit from the Te Anau; after mingling its waters with those of the Manipori Lake, the Waiau leaves it at a distance of 6 miles south from where it entered it. For the first 5 miles of its course, after leaving the Manipori Lake, the Waiau flows east by south in a slow sluggish manner; at that distance it receives the Mararoa, a very considerable tributary; it then suddenly bends to the south, and at the same time quickens its current; it then pursues a rapid course of upwards of 40 miles, in a general direction very nearly due south, when it falls into the sea. The Waiau receives in its course, from the west side, the Borland, Monowai, Dean and Lillburn, in the order named; and similarly from the east the Mararoa, Wairaki, Orawea, and many smaller streams; each of the streams just named is of considerable size, and two of them, the Mararoa and Monowai, may be classed as rivers, and will yet be noticed as such further on; still, so far as appearances indicate, there is no very perceptible increase of the Waiau after leaving the lakes; it seems to issue from them full-grown; its average breadth is 150 yards, its depth may be from 10 to 20 feet, and the rate of current, after being joined by the Mararoa, from 4 to 7 miles an hour. Judging of the volume of rivers by the extent of country drained by them, the Waiau would be rated at rather more than one-third of the Clutha. In this case, however, I think, from causes already mentioned, that there will be greater precipitation on the western watershed of the Waiau than on some of the watersheds of the Clutha, many of the latter being secondary ridges of mountains in the interior; if so, then there will have to be an allowance made in favour of the size of the Waiau.

The Mararoa takes its rise by means of two branches in the Livingstone Mountains, which unite together about half a mile above the North Mavora Lake. After flowing due south through the Mavora Lakes for 9 miles, the Mararoa for the next 18 miles of its course flows in a south-west direction through a finely-grassed and well-wooded valley; it then bends to the west a little north of the boundary line between the Otago and Southland provinces; for the next 10 miles of its course it runs nearly due west, running off and on the boundary line during that distance; it then receives the Whitestone Creek, a very considerable tributary that takes its rise near Snowdon, and has a south-west course of upwards of 20 miles through the Te Anau Downs. The Mararoa, after receiving the Whitestone, suddenly bends to the south, and after a further course of 6 miles S.S.W. it joins the Waiau about 4 miles south of the boundary line. The total length of the Mararoa from its most remote source to its confluence with the Waiau is 56 miles.

The Monowai is the outlet of the lake of the same name: the length of the river is 6 miles, and its direction E.N.E.; it joins the Waiau 12 miles below the confluence of the Mararoa. It was in the middle of November I saw the Monowai; it was then nearly a chain wide, and was from 18 inches to 2 feet deep, and had a current of not less than 5 miles an hour; the Monowai Lake must, therefore, receive the drainage of a very considerable extent of country to the west of the Hunter Mountains. This country, as seen in the beginning of November from the summit of Hindley and from Ardeer Peak, appeared to be very high and mountainous; all the peaks seen were covered with snow.

The Wairaki, Borland, Dean, and Lillburn are streams of from 10 to 20 miles in length; they are all dependent on snow, more or less, for their supply, and being so, they are very fluctuating in size.

The other tributaries of the Waiau, not yet mentioned, are those running into the Te Anau and Manipori Lakes; the principal are the Upukerora, Eglinton, Clinton, Worsley, Glaisnock, Doon, and Spey. The Upukerora takes its rise in the Dunton Forest, to the east of the Dunton Peaks, and after a south-west course of upwards of 20 miles it bends suddenly to the north, and after running in that direction for more than a mile it falls into the Te Anau Lake at Patience Bay. The Eglinton takes its rise by two branches from the mountains that bound the head of Milford Sound; they unite below the east side of Mount Eglinton, and after flowing for several miles through a deep wooded gorge the open country occupied by Mr. Hodge is entered, and after a further course of 8 miles the Eglinton falls into the east side of the Te Anau Lake. Its general course, from where its branches join to its mouth, is south-west. The Clinton, like the Eglinton, takes its rise from the watershed of Milford Sound; its general direction is south by east; it enters the Te Anau Lake at its east head. A boat can be taken up the Clinton for 1½ mile, and after that it is only 16 miles to the head of Milford Sound. The Worsley rises near Castle Mount, and flows down a deep wooded gorge, east by south, to the west head of the Te Anau Lake. The Glaisnock enters at the head of the north fiord of the Te Anau, after flowing in a south-east direction down a narrow, steep wooded gorge. The Doon has its rise near Mary Peaks, and only a few miles from the head of Caswell Sound and George Sound; it flows in an E.S.E. direction along a narrow, flat, wooded valley of about one-third of a mile in width to the head of the south-west arm of the middle fiord of the same lake. The Spey has its rise from the watershed of the West Coast, near the heads of Jail Passage and Breaksea Sound: for the greater part of its course it flows east by north through a very precipitous gorge; on emerging from it the Mica Burn joins it, and, after a further course of nearly 2 miles through a narrow wooded valley, the Spey falls into the head of the west arm of the Manipori Lake.

The Kawarau is the issue of the Wakatipu Lake: it leaves the lake at the base of Peninsula Hill, its exit is obstructed by masses of rock that divide its volume into several parts that take the form of falls when the lake is high. For the first mile or two of its course the current of the Kawarau is sufficiently slow to admit of cattle swimming easily across it, afterwards it becomes more rapid; at the distance of nearly 3 miles from the lake it is joined by the Shotover, and at a further distance of 6 miles by the Arrow. Its general direction up to this is east by north; it then bends towards the south, and at the same place enters an abrupt rocky gorge, through which it has a very tortuous course of 18 miles before entering the Clutha Valley. After a further course of 5 miles through it, the Kawarau joins the Clutha just before the latter enters the gorge of the Dunstan Mountains. The general direction of the Kawarau is from west to east; its confluence with the Clutha is nearly due east of where it leaves the Wakatipu Lake; the distance in a straight line is 23 miles, following the course of the river it will be 32 miles. The Kawarau drains about the same extent of country as the Upper Clutha River, and, as in this case the nature of the watershed is similar, they may be considered as of nearly equal volume at their junction. So great a body of water as the Kawarau possesses would, in favourable circumstances, have been of service in the inland navigation of the country, but there are various obstacles in connection with this river which render this impracticable: these are the rapid current, the narrow and tortuous channel, and the reefs of rocks which cross the channel at several places, besides at its exit from the lake.

The rivers that contribute principally to the Kawarau are the Dart, Rees, Greenstone, Von, Lochy, Shotover, and Arrow; of these the first five flow into the Wakatipu Lake.

The Dart is considerably the largest of the tributaries just mentioned; it issues in one stream from a deep wooded gorge west of Earnslaw, and at a distance, in a straight line, of 16 miles nearly due north of the head of the Wakatipu Lake, into which it flows; the bearing of the gorge and the size of the river there both indicate that it has its sources on or about the boundary-line between Otago and Canterbury. The glaciers of the Forbes and the Humboldt Mountains are situated on the opposite sides of the Upper Dart. That its supply depends almost entirely on melted snow and ice is evident from the great fluctuations that characterise its volume. Immediately below the gorge the channel widens out to a shingle-bed of from half a mile to a mile wide; this breadth is maintained on to the lake, a distance of 20 miles by the river. During the survey, the river ran over this shingle-bed in several streams; but flood débris showed that it is sometimes all covered.

The Rees enters the head of the Wakatipu Lake only a few yards east of the Dart. Like the latter, it also issues from a wooded gorge, at a distance, in a straight line, of 16 miles N.N.E. from the head of the lake. It has its upper sources in the ice and snow fields of the Forbes and Richardson Mountains. The flat part of its valley presents similar appearances to the Dart, though on a less scale, for that river is about three times the size of the Rees.

The Greenstone takes its rise by two branches, viz. the M'Kellar and the Caples. The M'Kellar branch, according to Mr. David M'Kellar, who explored its head sources about three years ago, "takes its rise near the head of Milford Sound, and after flowing through two small lakes and a considerable extent of bush, enters an open, narrow valley." It flows down this valley in a nearly straight line for 10 miles in a S.S.E. direction; it then bends at right angles, and after forcing its way through a very narrow gorge for 6 miles in an E.N.E. course, it is joined by the Caples branch from the N.N.W. The united Greenstone then flows in an easterly direction for nearly 2 miles before entering the west side of the Wakatipu Lake.

The Von is formed by the union of two branches, each about 9 miles in length. The south branch issues from the Eyre Mountains, and the north branch from the Thomson Mountains; they unite in a deep dell on the south side of Mount Turnbull, and after a course of 9 miles in a north-east direction, through a finely grassed valley, the Von falls into the west side of the Wakatipu Lake.

The Lochy, by means of several branches, drains the barren region enclosed by the Eyre Mountains. Its length is about 15 miles, and general direction east by north; it falls into the Wakatipu Lake at Halfway Bay.

The Shotover ranks next to the Dart of the rivers that are tributary to the Kawarau. It takes its rise in the ice and snow fields of the Richardson and Harris Mountains, and, as these are its principal sources, it attains to near its full size early in its course. This is for the first 15 miles south by east, then 8 miles south-west to the junction of Stony Creek, then 9 miles south in a general direction to Arthur's Point; it there leaves the mountains, and at the same time bends to the east for 3 miles, and then again south by east for other 3 miles, before joining with the Kawarau. On its west side it receives the famous creeks—Skipper's, Stony, Moonlight, and Moke (united)—in the order named. The Shotover, during the greater part of its course, is so hemmed in by opposing mountains that its banks are impassable in many places for either man or horse. The confined nature of its banks and the snow-clad watersheds sufficiently explain the sudden and overwhelming floods that characterise it. The incessant action of the river along one course for ages has cut out its bed into an abrupt gutter-like channel. This, mechanically speaking, may account for the rich auriferous deposits found in the bed of the Shotover; for, as the river kept deepening, the banks would slip into it as into a great sluice-box, where, coming under the action of so powerful a current, the gold would be washed out and deposited, while the lighter matter would be carried away.

The Arrow takes its rise from the snow on Mount Hyde, and after a crooked course through a succession of deep gorges, during which it receives several tributaries, all known to be highly auriferous, it emerges into the open country at Arrowtown; and after a further course of 6 miles along the base of the Crown Ridge, it joins the Kawarau. The distance, in a straight line, from the most remote source of the Arrow to its mouth is 15 miles; the course by the river will be a few miles more, and its general direction is south by east.

The Oreti rises in the Thomson-Mountains; for the first 22 miles of its course it runs parallel to the Mavora Lakes and the Mararoa River, at a distance from them of 2 to 4 miles; for the next 5 miles of its course it runs nearly due south, when, being joined by the Windley from the Eyre Mountains, it enters Southland after a course of 27 miles in Otago, the latter 17 miles being through a well-grassed valley.

The Wakaia takes its rise by several tributaries from the Rocky Mount and the Obelisk. It enters the Wakaia Forest, and after flowing through it for 8 miles it enters a fertile well-grassed valley, through which it meanders for 18 miles in a south-west direction. During this part of its course the Wakaia receives on its south side the Argyle Burn from the Umbrella Mountains; and on its north side the Gow, Steven, Steeple, Dome, and Garvie Burns from the Garvie Mountains. After receiving the Garvie Burn, the course of the Wakaia is nearly due south for 7 miles to its junction with the Mataura. The total length of the Wakaia will be upwards of 40 miles. At its confluence with the Mataura it is nearly of equal volume with that river.

Pasture.—There are 1635·8 square miles of pastoral country, of which 778·5 square miles belong to the country drained by the Waiau and Upper Oreti, 552·3 to the Kawarau, and 305 to the Wakaia. The grass-land occurs in detached portions, and under a variety of circumstances that render a detailed description necessary. Beginning with the Waiau District, the country on the west side of the Waiau River will have to be noticed firstly. The extent is 86 square miles, and consists principally of terrace-flats along the banks of the Waiau, which yield natural grasses abundantly, the nutritive qualities of which were very evident from the prime condition of the stock depasturing on them. On the south banks of the Monowai, and up the valley of the Lill, this district is diversified by the undulations of low ridges: these are much overrun with scrub that will yield generally to the clearing effects of burning off. There are, however, at the head of the

Lillburn several square miles covered with dense prickly scrub and bog-pine shrub, that would be almost impervious to fire, owing to the want of grass below to carry the flame along and through it. The Waiau River is a great hindrance to the traffic to and from this district. There is considerable risk in swimming cattle over, and as for sheep, they have all to be boated across. This disadvantage is compensated, I think, by the quiet so desirable in sheep-farming, and isolation from the contagion of epidemic disease. During the survey, while the stockowners on the east side of the Waiau were in the greatest dread of their flocks becoming contaminated by contact with a diseased flock in that district, those on the other side of the river had no apprehension from the same cause. Another advantage worth notice is, that the river and bush outline so fence in these runs, the one from the other, that the duties of shepherding the flocks are very considerably less than in open country. The small parklike patches on the west side of the Waiau, near its exit from the lakes, although apparently of little consequence from their smallness, are much valued by the stockowners for the paddock accommodation they furnish to the male portion of their flocks at certain seasons of the year. The clear at the base of Paddock Hill is peculiarly valuable for this purpose on account of its being bounded on the north side by the sluggish part of the Waiau, so that there is no difficulty in crossing and re-crossing that river at this place.

The remaining part of the Waiau District comprises 692·5 square miles of pastoral country, of which 429·5 belong to Otago, and 263 to Southland. The Southland portion lies between the Takitimo Mountains on the east, and the Waiau River on the west, and is south of the boundary line between the provinces. The Otago portion is wholly to the north of the same line, and embraces the Te Anau Downs, the Upper Oreti and Mararoa Valleys. The surface is diversified by the descending spurs of the Takitimo Mountains, by several extensive flats along the courses of the rivers, and of low undulating ridges over the Te Anau Downs. It is all very well grassed; blue tussock is the prevailing sort of grass, and oatgrass, anise, and other herbage is frequently met with. Excepting the higher parts of the Takitimo Mountains, a very considerable part of this country is under the elevation of 1000 feet above the sea-level. The Te Anau Downs may be stated as having a mean elevation of 1100 feet, and the Mararoa Valley rises to 2000 feet at Hamilton's Station. Around the north side of the Te Anau Downs and Mararoa Valley the forest covers the spurs of the mountains, so that the pastoral country is almost all under the highest of the elevations just named; it therefore may all be considered as free from snow during the whole course of the year, so far as the safety of stock is concerned. It only remains to be mentioned, that under this portion of country there is also included the Mararoa Valley, above the Mavora Lakes. This part of the valley, from the head of the Mavora Lakes to the Pondburn, is, for an average breadth of 2 miles, covered with as fine pasture as any part of the valley lower down; but from its high elevation, being nowhere less than 2100 feet above the sea-level, and rising from that till it merges into barrenness, near the source of the Mararoa, it is almost certain to be under snow for some time during winter.

The pastoral country drained by the Kawarau may next be noticed. Its extent is 552·3 square miles, lying principally around the Wakatipu Lake, and the valleys leading into it. Beginning at the head of the lake, and coming down the west side, there is no pastoral country till the mouth of the Greenstone is reached; there, on a terrace-flat, are found a few hundred acres of fine pasture. Continuing down the lake from the Greenstone 9 miles of a very rugged steep incline, covered with fern, is passed over before the valley of the Von is reached. This valley is several miles wide; it encircles Mount Nicholas and Pasture Hill, and runs back for 15 miles in a south-west direction, when it blends with the Oreti and Mararoa Valleys; the whole forming one continuous well-grassed, well-sheltered valley, between the Wakatipu Lake and the Te Anau Downs, of a height nowhere greater than 2600 feet above sea-level, and falling from that elevation on both sides to the level of the lakes. After passing the mouth of the Von Valley, the mountains again rise abruptly from the lake and leave little room, between its margin and the line of barrenness, for vegetation. The valleys of Collin's Bay and Halfway Bay unite together by a low saddle behind Bayonet Peaks, and make up between them several thousand acres of very fair country. South of Halfway Bay the west side of the lake rises precipitously, and, with the exception of some straggling scrub amongst the rocks, is entirely barren. Returning to the head of the lake, and coming down its east side, there will be (including the valleys of the Dart and Rees) 91 square miles of pastoral country gone over before reaching Fortune Cove; it consists of the spurs from the Richardson mountains, and of considerable flats at the head of the lake, and around Mount Alfred. This is all well-grassed, and is capable of bearing a large amount of stock throughout the year; for, from the fact of there being a large proportion of low country, not much over 1000 feet in elevation, there will always be abundance of feed during winter in the valleys when the higher parts are under snow. It is a considerable drawback to this country that, except by boating, there is no ready means of access to it, there being no beach along the lake at several places. The only way of driving stock off or on is by crossing the mountains near Moke Lake, at an elevation of 6000 feet; the track can only be taken by sheep, and that of course only when the snow has disappeared.

After passing the precipitous coast-line west of Fortune Cove there begins a stretch of low country extending along the margin of the lake for several miles. It consists of terrace-flats and of hills sufficiently low to be grassed over their summits. It reaches back to the Moke Lake, and then along the Moke Valley behind Ben Lomond to a junction with the Shotover Valley. Its extent, together with the Shotover and Arrow Valleys, and the low country extending east from Queenstown to the Crown Ridge, is 149 square miles. The valleys of the Shotover and Arrow have little or no flats. The mountain spurs running down to them descend from elevations of from 5000 to 8000 feet in so very steep and rugged a manner that, considering the broken nature of the country and the barrenness of its higher parts, not more than one-half of the extent has been classed in Table A as pastoral country. The low country extending east from Queenstown to the Crown Ridge is much the best, not only of the quantity now immediately under consideration, but also of the whole Lake District. It is an undulating extent of 20,000 acres, containing several large flats and one or two considerable hills. The whole is covered with a thick growth of grass, and is certainly entitled to rank with the very best pastoral country in the province. This country would, from affording a safe retreat to the flocks in the winter-season, have been of essential service in developing the pastoral resources of the higher parts of the Shotover and Arrow Valleys; but, as things now are, it has become a commonage for the large number of horses employed in packing, &c., on the Gold-fields.

Of the country lying around the Wakatipu Lake, that only remains to be mentioned which extends down the east side of the lake from Queenstown to Kingstown, and from thence down a valley of 6 miles in length to the Mataura River; the extent is 134 square miles. The low part of this country consists of the valley just mentioned and several thousand acres around Peninsula Hill. The high part consists of the slopes of the Hector Mountains and the ridges of the Eyre Mountains, drained by the Robert and Allen Creeks. The high and low parts of this division of the country bear a fair proportion to one another, and are so situated that the one develops the other.

The Wakaia Valley contains 305 square miles of pastoral country. The surface consists of a terrace-plain of alluvial flats, and of low, long ridges that flank the sides of the Garvie and

Umbrella Mountains. The lower part of this valley, from its dryness and the large extent of fine hill-pasture, is especially well adapted for sheep. Towards the head of the valley, where the flat part narrows into a mile wide, there is a tendency to wetness in the soil along the banks of the river; this circumstance, together with the fact of there being patches of manuka-scrub on the ridges, render this part of the Wakaia best fitted for cattle-runs.

Agricultural country.—The low elevation of the Waiau Valley naturally suggests its fitness for agricultural settlement. This, however, with the exception of the Waiau Plain is not the case. The flats on the west side of the Waiau are generally too shingly, and the country between the Takitimo Mountains and the Waiau too uneven for cultivation. Still there are several earthy spots of a few hundred acres each, scattered pretty equally up and down in the valley, suitable for that purpose. Around Mount York there will be about 20,000 acres of alluvial soil, to the cultivation of which there are no natural hindrances. It lies principally towards the Manipori Lake, and up the banks of the Mararoa and Whitestone, and will be from 600 feet to 1000 feet above the sea-level.

The agricultural country lying around the Wakatipu Lake consists of about 10,000 acres at the head of the lake, a few hundred acres at the mouth of the Von, and 10,000 acres lying east of Frankton; the latter quantity consists of a terrace-flat between Frankton and the Shotover, and of several alluvial flats between the Shotover and Arrow. The elevation above sea-level will be from 800 to 1100 feet. This elevation in some situations would have a bleak effect, but any tendency that way, as regards this country, is counteracted by the high mountains that encircle it; for, not only do they afford shelter, but the radiation of heat from them has at times, I believe, a very sensible effect on the increase of temperature. Be that as it may, I have no doubt, taking the climate and fertility of the soil as they are, that either cereals or vegetables would, if properly attended to, grow well and arrive at full maturity.

The Wakaia.—The whole of the flat of this valley, including an area of 70 square miles, may be classed as agricultural land; the terrace-plain, comprising one-half of it, would perhaps be too dry some seasons for cropping; to the other half, lying principally along the banks of the river, no such objection could be urged, some of it would require to be drained, for which there is plenty of fall.

Forests.—A reference to Table A will show that there are 959·2 square miles of forest. This belongs principally to the valleys of the Waiau and its tributaries, and consists of what is usually known (according to the kind) as red, black, and white birch,* red and black pine, and totara. The birch is much the most common tree of the forest; it was found to have a vertical range of at least 3400 feet, for it was seen a few feet above the sea-level, and then again it was found to be growing over a dip in the Hindley Ridge, at an elevation of 3400 feet above the sea-level. At the latter elevation the stems of the trees were of a zigzag unsymmetrical form, and the general appearance of the trees was squat and stunted. The other sorts, viz., black and red pine and totara were seen to be principally in the Dean Forest, at a low elevation, and within a vertical range of a few hundred feet. A sprinkling of them was seen in the forests along the shores of the Te Anau and Manipori Lakes. In the same locality, the tutu-tree, fuchsia, and numerous other shrubs flourish; and, by the variety of their foliage and brilliancy of blossom, contribute very considerably to the charms of the lake scenery. Up the valley of the Dart, totara was met with; on Pigeon Island, Wakatipu Lake, totara, pine, and goa; and in the Island Bush, Te Anau Downs, totara and pine, at elevations ranging between 1000 and 1400 feet. On Goldie Hill, totara and red pine were seen to flourish at an estimated elevation of 1700 feet; generally, however, for all elevations over 1000 feet, the birch is the tree of the forest. So far as this survey is concerned, I believe it will be an under-estimate to state that the birch occurs five times for one of all the other sorts put together. Seeing that so large a portion of the province is covered with this tree, it is interesting to know that so far as applied to economic purposes, it is found to answer well; the stock-owners use the black birch extensively for fencing, stockyards, &c. As for the red birch it has been found to answer well for building and for furniture and implement purposes. A wool-press was seen at Gillow's Station in successful operation, that was entirely made of red birch; there were no straps or bands of iron to withstand the strain, every detail being of this timber. The size of the trees varies very much according to the situation and elevation. In the valley of the Waiau, near the sea, totaras were seen up to 27 feet in girth, and pines and birches close on 20 feet in girth; on the higher elevations a very usual size of the birch was from 1 to 2 feet in diameter.

Barren Mountains.—There are 1960 square miles under this division. All the country to the west of the Te Anau and Mani-

---

* Hooker in his 'New Zealand Flora,' classes as Beeches what are here termed Birches.

To the Red he gives the name 'Fagus Menziesii.'
Black ,, ,, 'Fagus Fusca.'
White ,, ,, 'Fagus Solandri.'

I have still used the term Birch, the tree being known in the Colony as such.

pori Lakes (with the exception of what is forest) comes under it. The higher parts of this country are composed of igneous rocks; from the numerous fractures that generally occur in them it may be expected that mineral and metallic veins will there exist. On Mount Pisgah several veins of quartz, with flakes of mica imbedded, were seen to traverse it; and in the valley of the Doon, below Mount Pisgah, there are many large fragments of quartz and granite. A very cursory examination was made of the bed of the Doon and several other of the streams west of the lakes; mica was discovered in abundance, but no auriferous deposits. Clay-slate and metamorphic rocks occur between the Te Anau and Wakatipu lakes, and minute particles of quartz are found on the Thomson Mountains. Up to the date of survey, this country had not been prospected; supposing that gold exists there, it is not likely to be come at so readily as was the case on the Shotover and Arrow, for the valleys are more open and wide than those of these rivers, and the alluvial deposits are much covered over with the degradation of the mountain sides. The higher parts of the Humboldt and Forbes Mountains seem, from their rounded massive forms, to be composed of granite. Mica-schist flanks the sides of the mountains surrounding the Shotover and Arrow; it is inclined at almost every angle, and is exceedingly friable in some instances; where it forms the escarpment of a ridge it presents a very contorted appearance. Standing on the Harris Mountains, and looking over to the Upper Shotover and around Murum, a wild, hacked, precipitous scene presents itself, to which it would be difficult to find a parallel.

Means of Communication.—In the open country of the Waiau districts, a packhorse may be taken up or down or across any part of it, and drays can also be taken over the greater part of it. There are two dray-tracks by which it communicates with other districts; one is by the Orawia and round the north side of Twinlaw, and is entirely in Southland; the other is by the valley of the Oreti. It enters Southland near the junction of the Windley and Oreti.

The means of communication in the Wakatipu district is mostly by water; the nature of the country necessitates this. All the valleys open into the lake, and then the shores of the lake are impassable in many places, so that the only way of getting from place to place is by boating. In the Shotover and Arrow districts the rivers flow through gorges too abrupt to allow of their courses being followed; the only way, therefore, of communicating with the upper parts of the district is by crossing over the ridges. The tracts over these are from 4000 to 6000 feet above the sea-level, and the ridges being much broken, a long detour is often necessary so as to keep on the leading ridge, or to get up or down a passable spur; in this way several points on the Shotover and Arrow are reached by packhorses. Stores are congregated at these points, from whence supplies are distributed to the population along the river. The Wakatipu district has three routes of communication with country beyond its own boundaries; the principal is from Kingstown, at the south end of the lake, and this is the only part of the lake which drays can approach; the other two are bridle-tracks—one, from the west side of the lake, takes up the valley of the Von and continues on to the Te Anau Downs—the other leads over the ranges to the Cardrona and Upper Clutha Valleys. The position of Kingstown being at the end of the lake nearest the producing districts of the Colony, and the ports of the east coast, gives to it the command of the import trade of the lake. The magnitude of this trade has made the consideration of the means of communication with the Wakatipu districts a matter of primary importance. The impracticable nature of the Kawarau Valley as it now is, the nearness of the ports of Southland, and the lie of the country between them and the Wakatipu plainly point to them as the possessors of the greatest natural facilities for communication between the east coast and Kingstown. A dray-road by the Kawarau would, under present circumstances, be more than a rival to the route by Kingstown; but before a road could be formed and made, it is not unlikely that Southland will have so much improved the means of communication towards Kingstown, that goods will then be delivered as cheaply there as they ever can be at the Kawarau Junction; in this case, then, the proposed route would only be a rival to the one now in use. The difficulties to be overcome in the formation of a road along the Kawarau Valley are of no mean order; the river runs through a most precipitous gorge for 18 miles; opposite the confluence of the Nevis a mile or two would be saved on the length of road-line, but generally it would have to keep close on the river. An amount of side-cutting, bridging, &c., will have to be done before a substantial road is made, that, plainly, will make the cost per mile something great.

The known resources of the Wakatipu districts are forest, pastoral and agricultural lands, and auriferous deposits. The first three resources are so limited in quantity as to create little or no traffic to and from the district; it would, therefore, devolve almost entirely on the mineral resources of the district to support the road. Gold had been found up to the date of the survey over 600 square miles of country; the extent of country found to be payable, and from which the escort returns have come, extends over 360 square miles. The boundary line of this country describes a parallelogram; the north boundary is a line drawn from the head of the Wakatipu Lake, east, to the source of the Arrow on Mount Hyde;

the eastern boundary is a line from the source of the Arrow to its junction with the Kawarau; then for the remaining boundary lines, follow up the Kawarau to the lake, and then up the east side of the lake to its head; every creek within this extent, with only one or two exceptions, has been proved to be highly auriferous. The nearness of the Wakatipu gold-fields to the west coast suggests the mention of a route to it. The distance between the head of the Wakatipu Lake and the head of Milford Sound is only 27 miles; the mountain-ridges lie diagonally across the direct line between these two points; the height and abruptness of the ridges preclude the possibility of taking a direct course over them. The only way of traversing this, and, indeed, all the country bordering on the west coast, is to follow up the rivers to one or other of their sources, where generally there is a lower and more accessible part in the ridge over which a pass may be sought. The rivers are a greater hindrance in crossing this country than the mountains. In following them up, their channels are, as a rule, the only place available as a track; this of course necessitates the frequent fording of the river. Supposing, in the case of the west coast, there were really a good pass through the mountains, I believe that the rivers alone would so often interrupt traffic by their floods, that, practically considered, a route to the west coast is a thing not to be expected. At the very best, a bridle-track is all that may be hoped for. From these statements it follows as a sort of corollary, that the traffic of the country must follow the run of the rivers, and that therefore the eastern coast of the province is where the ports will ever be situated that command the interior districts.

I will conclude this Report by stating my belief that the extent of the pastoral and agricultural portion of the province has now been determined. The distance between the most westerly points of this survey and the coast-line is only a few miles; the great altitude of these points—the altitudes by Captain Stokes near the coast-line—the lie of the country and its appearance as actually seen, leave little doubt in my mind as to the utter barrenness of the region extending between the forests of the Wanaka, Wakatipu, Te Anau, and Manipori Lakes on the one side and the forests of the west coast on the other. To the south of this there is a considerable breadth of country to the west of the Princess Mountains as yet unexplored. What I saw of this country over the Howloko Lake consisted of undulating ridges covered with forest. Its exploration would have to be conducted from Preservation Inlet, or some of the other neighbouring inlets of the west coast.

Appended are Tables of areas, altitudes, and the register of the thermometer during the survey.

TABLE A.—ESTIMATED AREAS OF THE NATURAL DIVISIONS SURVEYED.

Pasture.

Districts.	Localities.	Area in Square Miles.	
Waiau	Open country on the west side of the Waiau River	86	
	Te Anau Downs, and the parts of the Mararoa and Oreti Valleys north of boundary line	387	
	Hodge's Run	41	
	Paddocks east side of Te Anau Lake	1·5	
	The pastoral part of Southland, between the Takitimo Mountains and Waiau River ..	263	
			778·5
Wakatipu ..	Valleys of the M'Kellar and Caples branches of the Greenstone River	8	
	Von Valley, and side of Wakatipu Lake between mouth of Greenstone and mouth of Afton Burn	128	
	Along margin of Lake, between Afton Burn and Half-way Bay	41	
	Valleys of Dart and Rees, and down east side of Lake to Fortune Cove	91	
	Islands in Lake	1·3	
	Country along the Lake between Fortune Cove and Queenstown, also along the north bank of the Kawarau, and up the valleys of the Shotover and the Arrow	149	
	Along the east side of the Lake, between Queenstown and Kingstown	67	
	Between Kingstown and the Mataura River, also the spurs of the Eyre Mountains drained by the Robert and Allen Creeks ..	67	
			552·3
South-Eastern	Wakaia Valley	..	305
	Total area	..	1635·8

Forests.

	Sq. Miles.		Sq. Miles.	
Dean	307	Brought forward ..	858·7	
Southland	4·5	Windley Creek	12	
Titiroa	104	Ashton Burn	1·5	
West of Manipori and Te Anau Lakes	186	Long Forest..	9	
		Greenstone River.. ..	8	
Eglinton	36	Dart	37	
Dunton	208	Rees	4	
Burwood	3·6	Miscellaneous	1	
Margin	3·6	Wakaia	26	
Bald Hill	6	Total		959·2
Carry forward	858·7			
		Carried forward		2595·0

	Sq. Miles.
Brought forward	2595·0

Lakes.

	Sq. Miles.
Te Anau	132·5
Manipori	49·7
Howloko	11
Monowai	10·5
Mavora (North and South) ..	5
Carry forward	208·7

	Sq. Miles.	
Brought forward	208·7	
Wakatipu	113·6	
Hayes	1·15	
Diamond	·85	
Moke, Sylvan, Bog, &c.	1	
Total		325·3

Swamp	3

Barren.

		Sq. Miles.
Longridge Mountains	.. ..	34
Princess	do.	47
Billow	do.	44
Hunter	do.	102
Matterhorn	do.	22
Kepler	do.	97
Murchison	do.	133
Barrier	do.	20
Stuart	do.	57
Franklin	do.	56
Castle	do.	42
Earl	do.	56
Carry forward	.. ..	710

		Sq. Miles.	
Brought forward	..	710	
Eyre Mountains	.. ..	215	
Thomson	do.	42	
Livingstone	do.	144	
Hector	do.	47	
Ailsa	do.	33	
Humboldt	do.	73	
Forbes	do.	84	
Takitimo	do.	36	
Richardson	do.	318	
Garvie and Umbrella	do.	164	
Harris	do.	87	
Dart (channel of river)	..	7	
Total	.. .. ..		1960

Total extent of country surveyed	4883·3

TABLE B.—ALTITUDE OF PRINCIPAL OBJECTS IN FEET ABOVE SEA-LEVEL.

Earnslaw	9200
Do	9165
Mount Christina	8476
Edward Peak	8459
Centaur Peaks	8284
Mount Ansted	8157
Mount Tyndall	8116
Mount Bonpland	8102
Cosmos Peak .. .. .. (?)	8000
Mount Larkins	7432
Mount Aurum	7322
Stone Peak	7222
Humboldt Ridge	7140
Bold Peak	6990
James Peak	6898
The Castle Mount	6872
Moffat Peak	6840
David Peaks	6802
Upper Peak	6748
Temple Peak	6731
Mount Hyde	6700
Jane Peak	6650
Stair Peak	6644
Mount Mavora	6590
Diana Peak	6530
Cecil Peak	6477
Symmetry Peaks	6350
Do.	6224
Mount Anau	6294
Mount Turnbull	6283
Mount Crichton	6185
Mount Lyall	6097
Mount Eglinton	6085
Mount Dick	6020
Rough Peaks	6002
Do.	5907
Skelmorlie Peak	5933
Countess Peak	5928
Hummock Peak	5934
Walter Peak	5956
Helen Peaks	5923
Do.	5921
Mount Owen	5806
Round Peaks	5794
Do.	5780
Ben Lomond	5747
Mount Soho	5743
Advance Peak	5740
Winton Peak	5759
Mount Kane	5740

TABLE B.—*continued.*

Flat Mount	5711
Mount M'Dougall	5667
Black Cone	5665
Titiroa	5643
Caroline Peak	5599
Mount Campbell	5593
Spire Peak	5587
Brunel Peaks	5559
Do.	5390
Do.	5170
Largs Peak	5555
Bay Peaks	5494
Mount Richmond	5491
Mount Eldon	5470
The Coronet	5413
Mount Burns	5402
Mount Pisgah	5345
Lorn Peak	5340
Family Peaks	5357
Do.	5220
Do.	5187
Do.	5117
Brown Peaks	5356
Do.	5285
Do.	5085
Cold Peak	5342
Telford Peak	5288
Eldrig Peak	5237
Jackson Peaks	5237
Do.	4738
Do.	4236
Bayonet Peak	5213
Snowdon	5208
Howitt Peaks	5178
Cleughearn	5156
Barrier Peaks	5161
Do.	5087
Do.	5013
Excelsior Peak	5114
Annick Peak	5114
Cathedral Peak	5134
Mount Maury	5090
Afton Peak	5043
Alexandra Peak	5046
Albert-Edward Peak	5030
Miller Peak	4995
Flecked Peak	4953
Mount Hamilton	4932
Halfway Peak	4930
Corner Peak	4890
Dunton Peaks	4893
Do.	4834
Cone Peak	4875
Billow Mountains	4884
Do.	4041
Leaning Peak	4858
Mount Nicholas	4827
Mount Luxmore	4811
Do.	4563
Steeple	4800
Alice Peak	4734
Beatrice Peaks	4715
Do.	4528
Dana Peaks	4684
Precipice Peak	4635
Tower Peak	4627
Hook Peak	4615
Steep Peak	4481
Forward Peak	4421
Mount Alfred	4412
East Dome	4440
Turret Peaks (highest part)	4373
Do.	4135
End Peak	4116
Titan Rocks	4068
Hindley	4050
Ardeer Peak	3670
Long Ridge (highest part)	3565
Knoll Peak	3548
Edge Peak	3483
Oblong Hill	3258
Mount Prospect	3246
Craigie Hill	2808
Peninsula Hill	2768
Dean Hill	2661
Highest part of Bridle Track between Te Anau Downs and Wakatipu Lake	2615
Helmet Hill	2050
Hamilton's Station	2010
Twinlaw	1874
The Beehive	1964
The Monument	1543
Mount York	1344
Pigeon Island	1564
Fern Hill	1165
Freestone Hill	1107
Hankinson's Station	1125
Gillow's Station	1066
Ridge between Lill Burn and Bryce Burn	780
View Hill	727
Cox and Shad's Station	490
Lill Burn Valley, near junction of Hindley and Ardeer branches	400

ALTITUDE OF LAKES.

North Mavora Lake	2073
Wakatipu	1069
Te Anau	694
Manipori	597

Howloko and Monowai not satisfactorily determined, but they may each be considered under 400 feet.

TABLE C.—REGISTER OF THE WEATHER.

Date.	Place.	Thermometer.		Remarks.
1862. Sept.		7 A.M.	2 P.M.	
8	Twinlaw	..	61	Strong west wind.
9	Do.	43	59	Do.
10	Do.	51	..	
..	Wairaki	..	81	Fine clear day.
11	Waiau	54	65	Dull and cloudy.
12	Howell's Station ..	50	53	Dull morning, rain in the afternoon.
13	Do. ..	49	54	Do. do.
14	Do. ..	39	60	Fine clear day.
15	Do. ..	31	56	Do.
16	Do. ..	42	..	
..	Lill Burn	..	65	Cloudy.
17	Do.	41	69	Clear.
18	Do.	43	61	Wet forenoon, clear afternoon.
19	Do.	38	80	Fine clear day.
20	Do.	50	75	Dull morning, clear afternoon.
21	Do.	58	61	Very wet day.
22	Do.	45	55	Do.
23	Do.	44	51	Dull forenoon, wet afternoon.
24	Do.	40	54	Do. do.
25	Do.	41	51	Very wet day.
26	Do.	46	61	Showery morning, dry afterwards.
27	Do.	44	71	Calm and cloudy.
28	Do.	50	96	Fine clear day.
29	Do.	51	56	Clear forenoon, wet afternoon.
30	Goldie Hill	42	55	Do. do.
Oct.				
1	Lill Burn	43	53	Showery.
2	Do.	45	56	Sunshine and shower.
3	Do.	46	56	Wet morning, clear afterwards.
4	Do.	50	67	Fine day, wet evening.
5	Do.	52	64	Fine clear day.
6	Do.	51	66	Dull and cloudy.
7	Do.	56	67	Dull, with showers.
8	Do.	39	60	Fine clear day.
9	Waiau	51	62	Wet forenoon, dry afternoon.
10	Do.	41	64	Dull and cloudy.
11	Do.	54	65	Do.
12	Do.	56	72	Fine clear day.
13	Do.	49	58	Showery.
14	Do.	44	62	Do.
15	Do.	50	58	Fine clear day.
16	Muscle Beach	51	68	Dull and showery.
17	Waiau	48	62	Fine.
18	Do.	60	67	Do.
19	Limestone Gorge ..	54	58	Very wet day.
20	Do. ..	42	53	Hail and snow.
21	Do. ..	39	56	Do.
22	Do. ..	39	57	Do.
23	Do. ..	48	60	Do.
24	Do. ..	43	67	Fine clear day.
25	Lill Burn	54	65	Do.
26	Limestone Gorge ..	52	68	Do.
27	Do. ..	51	..	

TABLE C.—*continued.*

Date.	Place.	Thermometer. 7 A.M.	Thermometer. 2 P.M.	Remarks.
1862. Nov.				
27	Lill Burn	..	75	Fine clear day.
28	Howell's Station ..	54	74	Dull and cloudy.
29	Wairaki	54	68	Do.
30	Do.	51	70	Dull, but fine.
31	Do.	51	72	Do.
Nov.				
1	Waiau	58	81	Fine clear day.
2	Do.	56	71	Drizzling rain.
3	Do.	55	72	Foggy and dull.
4	Do.	53	..	
..	Takitimo	..	81	Dull, with N.W. breeze.
5	Do.	62	51	Wind from N.W.
6	Do.	54	..	
..	Waiau	..	57	Squalls from N.W.
7	Black Mountain ..	52	56	Squally showers from N.W.
8	Do. ..	60	57	Clear, with wind from S.W.
9	Do. ..	58	70	Dull, with showers.
10	Waiau	55	73	Fine clear day.
11	Do.	63	..	
..	Hindley	..	59	Do.
12	Do.	51	59	Fog in the forenoon, clear afternoon.
13	Do.	63	52	Do. do.
14	Do.	52	62	Dull and cloudy.
15	Waiau	59	70	Fine clear day.
16	Do.	65	75	Do.
17	Do.	64	71	Do.
18	Do.	62	66	Wind from N.W. in the forenoon, showery afternoon.
19	Do.	64	..	
..	Takitimo	..	61	Dull and cloudy.
20	Excelsior Creek ..	59	..	
..	Takitimo	..	60	Do.
21	Mararoa	61	64	Cloudy forenoon, wet afterwards.
22	Do.	58	67	Dull, wind from N.W.
23	Do.	60	71	Do.
24	Do.	61	71	Do.
25	Do.	60	..	
..	Mount Prospect ..	..	56	Squally showers.
26	Mararoa	62	..	
..	Mount Prospect ..	..	76	Bright sunshine day.
27	Mararoa	57	84	Do.
28	Do.	60	75	Do.
29	Whitestone	65	69	Drizzling showers.
30	Do.	69	66	Wet forenoon, dull afternoon.
Dec.				
1	Do.	64	75	Drizzling rain and fog.
2	Do.	63	79	Fog in the forenoon, sunshine afternoon.
3	Do.	63	79	Sunshine and shower.
4	Manipori Lake ..	66	75	Sunshine at intervals
5	Do.	59	58	Wind from N.W., with ra.
6	Do.	44	60	Clear, wind from N.W.
7	Do.	50	61	Do.

Table C.—*continued.*

Date.	Place.	Thermometer. 7 A.M.	Thermometer. 2 P.M.	Remarks.
1862. Dec.				
8	Manipori Lake ..	51	75	Clear, wind from N.W.
9	Do.	55	80	Fine clear day.
10	Do.	53	66	Do.
11	Do.	62	84	Fog in the morning, fine afterwards.
12	Do.	61	69	Wet morning, dry afterwards.
13	Do.	56	63	Very wet day.
14	Do.	59	64	Dull and showery.
15	Do.	60	69	Dull and cloudy.
16	Do.	57	71	Do.
17	Do.	60	77	Fine and clear.
18	Do.	61	78	Do.
19	Do.	63	84	Do.
20	Do.	57	..	Fog in the forenoon.
..	Te Anau	..	71	Clear afternoon.
21	Do.	60	83	Very fine.
22	Do.	62	65	Dull and cloudy.
23	Do.	65	68	Wet and stormy.
24	Do.	64	69	Strong wind from the N.W.
25	Do.	66	80	Clear, wind from N.W.
26	Do.	67	67	Wet and stormy.
27	Do.	66	67	Very wet.
28	Do.	62	71	Fine and clear.
29	Do.	64	74	Do.
30	Do.	69	75	Do.
31	Do.	59	65	Dull and cloudy.
1863. Jan.				
1	Do.	69	78	Do.
2	Do.	64	61	Do.
3	Do.	55	59	Do.
4	Do.	60	65	Dull forenoon, wet afterwards.
5	Mount Pisgah ..	46	..	
..	Te Anau	..	59	Do.
6	Te Anau Lake ..	54	58	Very wet day.
7	Do. ..	55	75	Fine clear day.
8	Do. ..	59	69	Dull and cloudy.
9	Do. ..	65	72	Do.
10	Do. ..	60	76	Fine and clear.
11	Do. ..	61	..	
..	Mount Eglinton ..	..	69	Do.
12	Do. ..	53	..	
..	Te Anau	..	66	Clear forenoon, dull afternoon.
13	Do.	58	72	Fine and clear.
14	Do.	69	76	Do.
15	Do.	68	98	Do.
16	Manipori	75	87	Do.
17	Upekerora	71	79	Dull and cloudy.
18	Do.	68	78	Do.
19	Do.	60	..	
..	Whitestone	..	82	Dull forenoon, clear afternoon.
20	Do.	72	76	Dull and cloudy.
21	Do.	67	75	Drizzling rain.
22	Mararoa	62	78	Do.
23	Do.	61	74	Dull, and then clear.

TABLE C.—*continued.*

Date.	Place.	Thermometer. 7 A.M.	Thermometer. 2 P.M.	Remarks.
1863. Jan.				
24	Oreti	61	84	Clear forenoon, wet afternoon.
25	Do.	65	75	Dull with showers.
26	Do.	64	74	Dull and cloudy.
27	Mararoa	65	..	
..	Bald Hill	..	63	Do.
28	Mararoa	60	..	
..	Bald Hill	..	48	Do.
29	Mararoa	54	..	
..	Mavora Lake	..	65	Dull morning, clear afternoon.
30	Do.	61	64	Wet day.
31	Do.	54	..	
..	Cold Peak	..	51	Dry and clear.
Feb.				
1	Mavora Lake	60	76	Do.
2	Do.	65	77	Drizzling rain.
3	Oreti	62	72	Strong wind from N.W.
4	Do.	64	74	Wet day.
5	Do.	65	71	Clear, wind from N.W.
6	Do.	54	69	Dull forenoon, wet afternoon.
7	Von River	59	70	Dull and cloudy.
8	Pond Burn	55	67	Clear.
9	Von River	55	66	Showery.
10	Wakatipu Lake ..	62	70	Dull and cloudy.
11	Do. ..	60	71	Do.
12	Do. ..	64	..	
..	Mount Nicholas ..	..	61	Do.
13	Wakatipu	60	..	
..	Mount Nicholas ..	..	47	Do.
14	Wakatipu	62	75	Fine and clear.
15	Do.	65	90	Do.
16	Do.	61	82	Dull and foggy.
17	Do.	68	89	Clear.
18	Rees River	62	72	Fine and clear.
19	Mount Alfred	68	84	Do.
20	Rees River	63	86	Do.
21	Dart River	66	83	Do.
22	Do.	53	83	Do.
23	Diamond Lake ..	69	..	
..	Rees River	..	86	Do.
24	Wakatipu	66	67	Very wet day.
25	Do.	65	78	Dull and cloudy.
26	Do.	67	78	Fine and clear.
27	Do.	65	85	Do.
28	Do.	62	72	Wet morning, dull after.
March.				
1	Do.	59	72	Fine and clear.
2	Do.	59	75	Do. wind from N.W.
3	Do.	69	75	Do. do.
4	Frankton	62	..	
..	Peninsula Hill ..	..	55	Dull forenoon, wet after.
5	Frankton	56	..	
..	Peninsula Hill ..	..	73	Dull forenoon, clear after.

Table C.—*continued.*

Date.	Place.	Thermometer.		Remarks.
		7 A.M.	2 P.M.	
1863. Jan.				
6	Frankton	52	..	
..	Shotover	..	84	Fine and clear.
7	Haye's Lake	64	80	Do.
8	Arrow River	61	81	Dull forenoon, clear afternoon.
9	Do.	68	69	Fine and clear.
10	Harris Mountains ..	54	52	Do.
11	Do. ..	32	46	Dull and cloudy.
12	Shotover	61	68	Fine sunshine.
13	Wakatipu	63	81	Do.
14	Queenstown	62	75	Do.
15	Ben Lomond	55	67	Dull and cloudy.
16	Do.	54	62	Dull forenoon, wet afternoon.
17	Wakatipu	53	79	Fine and clear.
18	Do.	62	77	Do.
19	Do.	58	64	Showery.
20	Do.	61	75	Do.
21	Eyre Mountains ..	63	68	Sunshine day.
22	Wakatipu	61	71	Very wet day.
23	Do.	52	73	Showery.
24	Do.	59	74	Dry and clear.
25	Kingstown	52	56	Showery.
26	Do.	56	68	Dry and clear.
27	Mount Dick	54	52	Dull.
28	Mataura	55	76	Dull forenoon, clear after.
29	Do.	56	81	Fine and clear.
30	Do.	51	65	Dull, with fog.
April.				
4	Wakaia	45	71	Fine and clear.
5	Do.	44	70	Do.
6	Do.	48	50	Wet and stormy.
7	Do.	39	52	Do.
8	Do.	47	66	Fine and clear.
9	Do.	50	65	Dull morning, wet after.
10	Do.	48	62	Fine.
11	Do.	34	66	Do.
12	Do.	42	63	Wet and cloudy.
13	Do.	31	67	Fine.
14	Do.	49	71	Do.
15	Do.	51	72	Do.

Note.—The bearings of the survey of the Waiau districts are from the true meridian of Mount York, lat. 45° 33′ 23·4″ s.; long. 167° 47′ 58·6″ e. of Greenwich. Reference bearing on true meridian to Mount Hamilton, 105° 47′. The datum-line for altitudes is the highwater-mark, Bluff Harbour. The bearings of the Wakatipu districts are from Mount Nicholas, lat. 45° 07′ 24·3″ s.; long. 168° 28′ e. of Greenwich. Reference bearing on true meridian to the Crown, 64° 11′. The altitudes are with reference to Mount Pisa, 6426 feet—one of the elevations determined by the Reconnaissance Survey of 1857-8. The Wakaia district has been plotted on the map of the south-eastern districts with reference to the positions of the Pyramid and East Dome, as laid down on it by Mr. Garvie. The altitudes are relative to the Black Umbrella, 3580 feet above sea-level, also determined by Mr. Garvie.

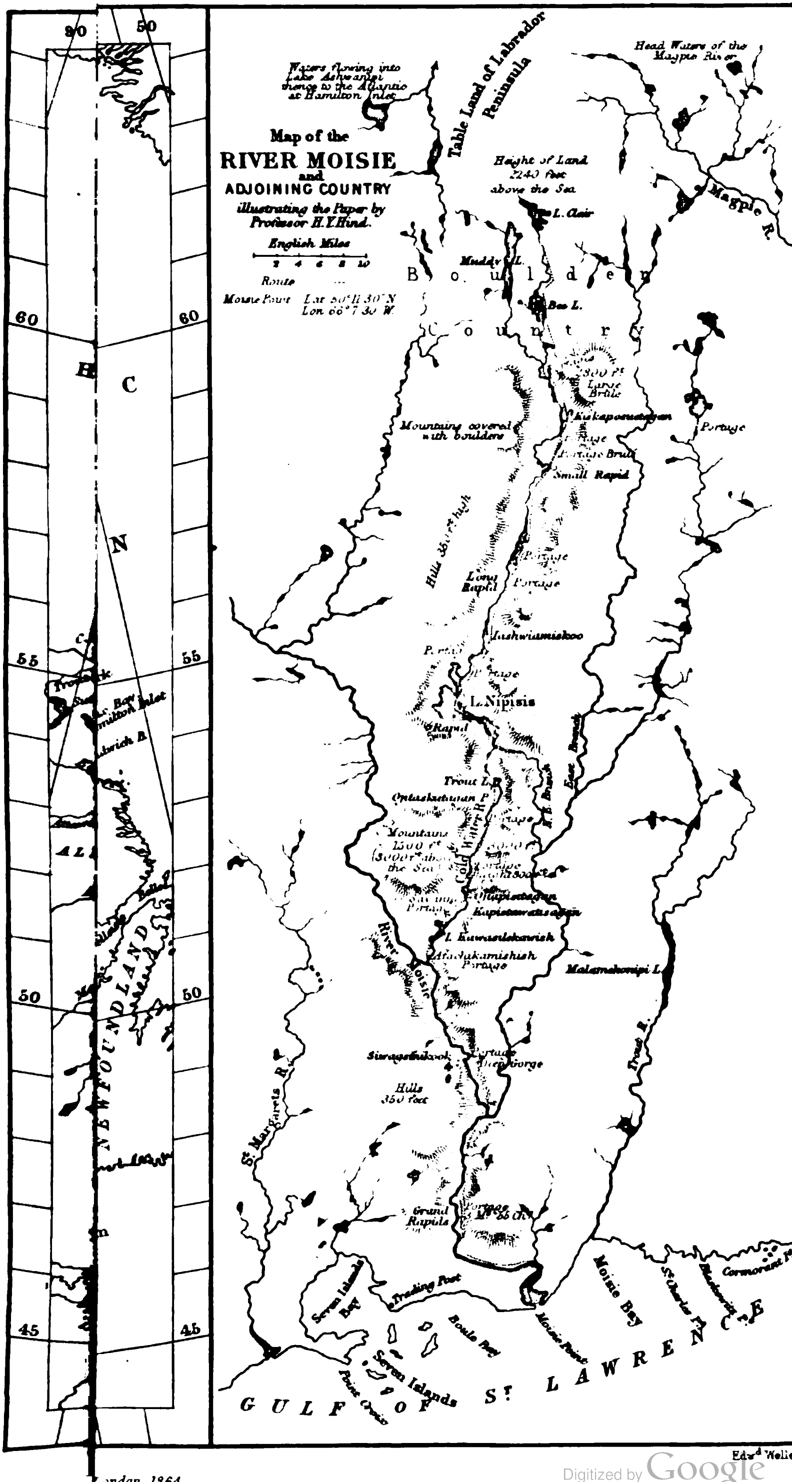
The distances throughout the survey were determined from bases measured twice by a common chain; artificial marks were set up till a length of 3 or more miles was obtained in the sides of the triangle, after that natural marks, such as mountain-peaks, edge of landslips, &c., were used as points for triangulation; where this was impracticable, then the method of converging angles was had recourse to. Up the Fiords of the Te Anau and Manipori Lakes, where, on account of the inaccessible nature of the mountains, and the shore-line being shaded over with foliage, neither a triangulation could be carried on, nor bases measured, differences of level between the lake and one or more commanding peaks were used as a base for determining distances. This method, from the rapidity it gave to the execution of the work, was found to be of great value under the circumstances. There was generally no difficulty in finding a suitable mountain-peak, a mile or so in vertical height above the level of the lake; the angle of elevation to which, after the necessary corrections had been applied, giving an excellent means of determining distances up to 7 or 8 miles. The bearings were (from the same reasons as rendered a vertical triangulation necessary) magnetic. Care was always taken on returning to the stations of the true meridian to observe if there was any local deviation in the variation of the compass. In every other part of the survey the work was done on the true meridian. The difference of bearing between the meridians of Mount York and Mount Nicholas was found to be 30′; the difference *to be added* to the meridian of Mount Nicholas. The difference of bearing between the meridians of Mount Nicholas and Lindis Peak 44′, the difference *to be added* to the meridian of Lindis Peak. These differences are not to be taken as precise, seeing that the instrument had to be set several times to natural objects in taking on the bearings from meridian to meridian; but they may be taken as showing a general agreement throughout the survey as to bearing, for the apparent discrepancies are very nearly such as are accounted for by the convergence of the meridians to the Pole. The difference between the meridians of the Bluff and Mount York, obtained in a similar manner to the other differences, is 29′, *to be added* to the meridian of the Bluff. In plotting the survey, the latitudes of the prime stations were found to close the one with the other, as also with the latitude of Mount Hamilton, as determined by the Reconnaissance Survey of Southland. A discrepancy of rather more than 1′ of longitude, or nearly 5″ by chronometer, exists between the longitudinal positions of Mount Hamilton, as determined from the two surveys; as the discrepancy is one of absolute distance, it does not affect the value of either survey. The desirability of having a check on the chronometrical determination of the longitudes of meridians was kept in view during the survey by carrying on, with as much care as possible under the circumstances, a triangulation based on short lines. After plotting the work to the scale of one-half inch to the mile, it is satisfactory to state, considering the rugged nature of the country, that the difference between the chain and chronometrical measurements of the distance between Lindis Peak and Mount York was not appreciable; the meridian of Mount Nicholas when brought to the same test, shows a difference of 2½″ by chronometer.

To check the altitudes, several peaks were determined, both from the data of Mount Pisa and from the data of the Bluff. The nearest agreement of the two determinations was that of Earnslaw, the difference being only 2 feet. The greatest disparity was in the two determinations of Mount Nicholas, the difference being 107 feet. The angular measurements of the survey were all made (with the exception of the astronomical observations), by a 4-inch Everest theodolite. Throughout the survey, an equal attention was given to the details of each district; so that unnecessary minuteness was not obtained in one part at the expense of vagueness in another.

V.—*An Exploration up the Moisie River, to the Edge of the Table-land of the Labrador Peninsula.* By HENRY YOULE HIND, M.A., F.R.G.S., Trinity College, Toronto.

Read, January 25, 1864.

THE Moisie River has for centuries been the canoe-route of the Montagnais tribe of Indians from the Gulf of St. Lawrence to the interior of the Labrador peninsula; and within the last fifteen years this river has formed the route by which a few families of the Nasquapee Indians, whose hunting-grounds lie on the table-land, have reached the gulf. The mouth of the Moisie is about 18 miles east of the well-known Bay of Seven Islands; and, as the general direction of its course is very nearly due north, it forms, probably, the shortest route by which the table-land can be reached from this part of the gulf. It has also this advantage, that the north-east branch is separated by a very low water-parting from the head-waters of the Ashwanipi, or Hamilton River, the great river of the table-land, which, after a course of about 400 miles, empties into Hamilton Inlet, and forms an inland canoe-route, in



Map of the
RIVER MOISIE
and
ADJOINING COUNTRY
illustrating the Paper by
Professor H. Y. Hind.
English Miles
Route
Table Land of Labrador Peninsula
Waters flowing into Lake Ashwanipi thence to the Atlantic at Hamilton Inlet
Head Waters of the Magpie River
Height of Land 2240 feet above the Sea
L. Clair
Magpie R.
Muddy L.
Boulder Country
Bee L.
Mountains covered with boulders
Kukaposnatagan
Portage
Small Rapid
Hills 350 ft high
Long Rapid
Portage
Ashwanimiskoo
L. Nipisis
Trout L.
Mountains 1500 ft
Cold Water R.
East Branch
Kupistewatsagan
L. Euwasukawish
River Moisie
Malamahonipi L.
Trout R.
Sirrapshikook
Deep Gorge
Hills 350 feet
St. Margarets R.
Grand Rapids
Trading Post
Seven Islands Bay
Seven Islands
Point Croix
Boule Bay
Moisie Point
Moisie Bay
St. Charles Pt.
Cormorant Pt.
GULF OF ST. LAWRENCE
60
55
50
45
C
N
NEWFOUNDLAND
Hamilton Inlet
Edwd Weller
London 1864

conjunction with the Moisie, between the ancient rendezvous of the Montagnais, Seven Islands, and Hamilton Inlet. I have every reason to believe that this route is one of great antiquity, judging from the condition of the portage-paths, the numerous remains of lodge-poles, stones for the vapour-bath, and old camping-grounds, which were seen as far north as 51° 40′, or close to the edge of the table-land, and within sight of the dividing ridge and the sources of the Ashwanipi River.

The distinguishing features of the scenery on the Moisie are its rapids, falls, and impetuous currents; the deep gorges through which it occasionally flows, the precipitous rocks limiting the lower part of its valley, and the frozen streams descending from their summits, which, when the accumulated ice gives way in the summer months, brings with it masses of rock, and sweeps every yielding thing in its downward course, like an avalanche, to the valley below.

Forty-five miles from the mouth of the river the current becomes too strong for canoes, being, in fact, a continuous rapid, and the canoe-route diverges to a small tributary between the west and the north-east branches. There is no apparent difference in the volume of water carried by either branch of the Moisie just above their point of junction and where they meet. The river is about 150 yards broad in June.

Coldwater River is the name of the small tributary which forms the canoe-route for the next 25 miles, before the north-east branch of the Moisie is struck. Some conception of the character of the country through which the river flows in the short space of 25 miles may be gleaned from the fact that Trout Lake, the source of Coldwater River, which also sends water to the north-east branch, 6 miles off, in a northerly direction, has a fall of nearly 1500 feet.

After reaching the north-east branch, 70 miles from the sea, and 1300 feet above it, the Moisie flows through a comparatively level lake country for a distance of 30 miles. Innumerable boulders lie scattered over the hill-sides and in the valley of the river throughout the whole of this level portion of the Moisie valley. The rocks are covered with the richest profusion of mosses and lichens. Nothing of its kind can exceed the marvellous beauty of these humble vegetable forms in the "boulder" country. Where the lichens have been burned by the spread of fire, owing to the carelessness of Indians, the boulders are seen to lie in tiers, three, and even four deep, their dimensions varying from 5 to 20 feet in diameter. About 95 miles from the gulf, in a straight line, another rise takes place in the general surface of the country, which continues, with a gentle slope, to the table-land. The height of the portage forming the southern limit of this step is 1850 feet above the sea-level; and the summit of a dome-shaped rock which overlooked the dividing ridge 15 miles further north, was found to be a little more than 2200 feet above the sea-level, which is about the altitude of the sources of the Ashwanipi or Hamilton River on the table-land. The course of the Ashwanipi lies roughly parallel to the north shore of the gulf, according to the Indians, who make it their canoe-route to the Hudson Bay Company's post at Petshikupau, and thence to Hamilton Inlet.

The chief mountain-range through which the different branches of the Moisie find their way, was estimated to have an altitude of about 3000 feet above the sea. The portage-path in the gorge through which Coldwater River flows, was found to be 1460 feet above the same level. The general direction of this range is roughly parallel to the north shore of the gulf, having an easterly and westerly trend; and the three branches of the Moisie flow in deep gorges cut through it nearly at right angles to its axis, which, according to the statement of Indians, is prolonged far to the east and west.

The sources of the Magpie River, which enters the gulf 65 miles east of the Moisie, can be distinguished from the head-waters of the north-east branch, and the peaks of the Mingan Mountains were just discernible in the eastern horizon from the same point of view.

The Mingan Mountains lie at the head-waters of the Mingan River, one of the largest tributaries to the gulf, next to the Moisie, on the southern slope of the Labrador peninsula.

Far to the north-east a series of snow-capped peaks were seen, distant two days' journey in snow-shoes (about 60 miles); but, with this exception, the whole horizon to the north and north-west was bounded by a low undulating outline, rarely rising above the point of view. To the south, the distant peaks of the "Top of the Ridge Range" was visible, from which the Indians told us ships in the gulf, and the sources of the Ashwanipi River, could be discerned on a clear day in the summer months.*

* The Ashwanipi or Hamilton River has been described as far as Petshikupau by gentlemen in the service of the Hudson Bay Company, [Mr. M'Lean, 'Notes of a Twenty-Five Years' Service in the Hudson Bay Company.']. Petshikupau of the Nasquapees is the now abandoned post, "Fort Nascopee," and a description of the river from this point to Hamilton Inlet has been given by Mr. M'Lean, who descended it in 1839.

Several papers have been read before the Literary and Historical Society of Quebec on different parts of the Labrador Peninsula, and are published in the earlier volumes of their Transactions (1842), and an interesting account of the Mistassinni country north of the Sangenay River was published in 1861 from the manuscript notes of the celebrated botanist André Michaux, who journeyed from the Gulf of St. Lawrence to Rupert's, Hudson's Bay, in 1782, following the track of the Jesuit missionary Père Albanel and his companions in 1672. [For a brief

The extensive conflagrations which have swept over a very considerable portion of the peninsula, have been the chief cause of the diminution in the numbers of the Indians, who once hunted in the midst of an abundance of animal life, to which former forests gave shelter.

From the summit of a hill near the head of Lake Nipisis, I had a fine opportunity of witnessing the desolation produced by these conflagrations. Towards the east a succession of lakes, studded with islands, lay in the valleys leading into the one partially occupied by Lake Nipisis; and an illimitable forest, with bare rocks rising out of it, was bounded only by the horizon in that direction; but north and north-west, as far as the eye could reach, lay a black and gloomy country, over which fire had passed many years ago. Myriads of boulders were strewed over the hills and in the valleys; and, weathering white, they formed a prominent feature in the black desert the fire had occasioned.

The rocks observed in the valley of the Moisie River belong to the Upper and Lower Divisions of what was formerly described by Sir William Logan as the Laurentian Series of Canada, but since divided by that distinguished geologist into two divisions, the Upper, termed provisionally the Labrador Series, and the Lower, or Laurentian Proper. Labrador rocks were first recognised at the mouth of Coldwater River, and it is probable that the mountain region of the "Top of the Ridge Range," extending from the mouth of Coldwater River to Trout Lake, is made up of the rocks of this series.

The entire aspect of this region leads to the supposition that it has been moulded by the action of ice, and the valleys in which the rivers flow are probably those of ancient glaciers. The descriptions given by the few who have penetrated far into the interior of this country, tend to confirm the impression that it is a boulder-covered country from Lake Mistassinni to Ungava Bay, at all levels higher than 800 or 1000 feet above the sea.

The most remarkable forms which vegetable life assumes on the Moisie, are those of mosses and lichens. Among the latter the "caribou moss," as it is termed (*Cladonia rangiferina*), is the most widely distributed, and is probably the most important, as constituting the chief food of the reindeer, or caribou. It is however, remarkable that this lichen was more frequently observed on the gneiss of the Laurentian Series, than on Labradorite rocks; while on the other hand, the presence of a luxuriant forest of spruces and white birch always indicated the proximity of rocks

---

account of these descriptions of different parts of Labrador Peninsula, see 'Explorations in the Interior of the Labrador Peninsula,' by the author. Longmans, 1863.]

of the lime-felspar series. Large white birches, 18 inches in diameter, and white spruce of the same dimensions, and from 40 to 50 feet and more in altitude, were seen clothing the hill-sides of the valley of the north-east branch, at Bear Lake, about 90 miles from the gulf. A land-slide close at hand showed the rock to consist of a granitoid gneiss, probably a member of the Labrador Series.

The tripe de roche (*Sticla pulmonaria*) is also everywhere abundant, and is sometimes used, with the buds of the birch-tree, as an article of food by the Indians in times of scarcity. The Labrador tea-plant (*Ledum palustre*) was found growing everywhere after passing Coldwater River portage. On the portages the larch, the white birch, and the white spruce, were seen to grow wherever they could find nourishment, by sending their roots into fissures in the rocks; but in such an unkindly soil they rarely reached an altitude of more than 20 feet, and it was only in the valleys or on the sloping sides of the Labradorite rocks that they acquired the dimensions already given. In the valley of Coldwater River, near its mouth, where gigantic land-slides of Labradorite had occurred and where occasionally the iridiscent colours characteristic of certain varieties of this rock were seen, the forest growth was very luxuriant, and would have been no discredit to a more genial clime.

This now desolate country was formerly peopled with numerous bands of Montagnais tribes on the flanks of the table-land, and by a kindred tribe, the Nasquapees, whose hunting-grounds lay on the table-land itself. These tribes speak dialects of the Cree language; and among the Nasquapees who have not lost the ancient customs and habits of their forefathers by contact with white men, many peculiarities observable among the prairie tribes on the Saskatchewan, are recognised as practised by them. A peculiarity in the form of their stone pipes is worth remarking; and, by comparing the pipes of the Plain Crees, whose hunting-grounds lie on the south branch of the Saskatchewan, with those of the Blackfeet and the Nasquapees, a marked similarity will be noticed. A similar distinctive form of pipe belongs to the Ojibways, of Rainy Lake (the Lake of the Woods) and the Swampies, of Lake Winnipeg, who also speak the Ojibway language; and a third characteristic form of pipe distinguishes the Chipewyans, whose hunting-grounds lie to the north of the Great Cree nation.

The Nasquapees live in skin tents, like the Crees of the great Western plains. They also smoke the roasted leaves of the bearberry, the red-barked willow (*Cornus sericeus*), and another willow common on the borders of lakes. The people of this tribe are tattooed to a small extent. Short parallel lines are cut from the cheek-bone to the nostril, and the markings are made permanent by rubbing charcoal or some colouring substance into the wound. The hunting-grounds of this people extend from Mistassinni Lake to the Atlantic coast of the Labrador peninsula; and there exist traditions among both Nasquapees and Montagnais, of former battles with the Iriquois, or Mohawks, near Trout Lake, at the source of Coldwater River, which must have occurred more than two centuries ago. Their conflicts with the Esquimaux have continued down to a very late period. When we take into consideration the great jealousy with which the Indian races of the American continent, speaking different languages, regard the invasion of their territory, or hunting-grounds, the vast extent of surface over which the Cree nation has established itself, cannot fail to possess great interest to the ethnological inquirer. The hunting-grounds of the Cree nation extend from the foot of the Rocky Mountains to the Atlantic coast of Labrador, a distance exceeding 2500 miles, with a mean breadth of 600 miles. Before the advent of the white man, and prior to the general destruction of forests, mosses, and lichens, by fire, the Nasquapees were a numerous people, feeding on the reindeer and rabbit, which were everywhere abundant, and on the porcupine, which was formerly very common on the south flank of the table-land.

VI.—*Notes on the Mountains and Glaciers of the Canterbury Province, New Zealand.* By DR. JULIUS HAAST, M.D., F.G.S.

Read, February 8, 1864.

IN looking at a map of New Zealand (see p. 56) we observe that a longitudinal mountain-chain of great magnitude, forming the watershed of the island, runs from north-east to south-west, the continuity of this chain being broken through only in very few places, otherwise presenting high and abrupt walls of great altitude through its whole length.

This backbone, as it has sometimes not inappropriately been called, begins at the south-western end of the Middle Island, and continues to the east cape of the Northern Island, broken through by Cook's Straits, and by a few rivers flowing through lateral and oblique fissures. It would make this memoir far too long, were I to enter into more details concerning the remarkable features of this magnificent chain throughout both islands, and I shall therefore treat of that portion only which occurs in the province of Canterbury.

It reaches its greatest altitude in this province, where, clad in a garment of dazzling snow, from which enormous glaciers descend, it presents us with such wild and fantastic forms, that it has with justice been named the Southern Alps. Beginning at Mount

Aspiring, the southern boundary of our province, the Southern Alps stretch, with the exception of a few passes, of which I shall speak in the sequel, to a remarkable col about 3500 feet high, called Harper's Pass, which forms the northern boundary. It is here, we may presume, that the Southern Alps proper terminate, because at the north of this col, which leads from the sources of the Hurunui (east coast) to those of the Taramakau (west coast), the central chain is singularly broken, and also decreases in altitude, although it rises again in the Spencer Mountains (Nelson province), and attains a great altitude in Mountains Franklin and Humboldt.

Looking at the different systems of the Alps; we meet, south of the Hurunui Pass, with a large mountain-mass, which still preserves the Maori name of Kaimatau (eat birds). From the perpetual snow with which it is covered, numerous glaciers—some of considerable size—descend, giving rise to the main branch of the Waimakiriri (cold water), flowing to the east coast, whilst on its still unexplored western slopes, the outlets of some others fall, partly into the Taramakau and partly into the Okitika and Arahaura rivers (west coast).

A high pass leading into the river Arahaura, and apparently very difficult of access, exists here at the southern slopes of the large pyramidal mass of Kaimatau. The only knowledge of this pass which I possess was obtained through the description of a few aged natives at the west coast, who in former times had travelled by it; but the narrators never ended their description without adding that it was exceedingly bad and rough, and therefore in disuse.

At the southern side of this truly Alpine pass, another high mountain-system rises, of the orographical features of which we do not as yet possess any positive knowledge, although surveyors have chained up the rivers descending from it, almost within sight of its glaciers. The only view which I obtained of this large mountain-mass was from the summits of Mount Torlesse and Big Ben, in the Thirteen-mile bush-range, both on the southern banks of the Waimakiriri. The pyramidal form is also predominant here. Enormous snow-fields lie on its sides, from which large glaciers descend towards the valleys. The altitude of the highest summit I estimated at not less than 10,000 feet.

This system again ends near the southern and main branch of the Rakaia, and a pass of about 4500 to 5000 feet high brings the explorer to the west coast, by following the river Okitika. This pass was discovered in 1859 by Messrs. Butler and Baker, whilst seeking a road to the west coast; but rainy weather setting in, added to want of provisions when on the col, compelled them to abandon their project. The late Mr. Whitcombe was, last summer, the first who, by crossing here and following the Okitika, reached the west coast; and we have the more deeply to deplore the sad loss of this accomplished engineer and surveyor, as his field-books, containing the results of his arduous journey, were also lost. This col is situated on the northern side of the main branch of the Rakaia, and forms also the northern boundary of Mount Tyndall, so named by me in honour of Professor J. Tyndall, the eminent natural philosopher.

Mount Tyndall consists of a mighty system of mountains culminating in one large pyramidal mass of about 11,000 feet, the latter generally concealed by a great many surrounding peaks of nearly the same altitude. It is one of the principal centres of our Alps, and of great extent. Enormous snow-fields lie on its flanks, from which large glaciers descend, some of which belong to the largest in the whole range. The main sources not only of the Rakaia, but also of the Rangitata, and the principal glacial source of the Godley River, which forms Lake Tekapo, are here situated; the outlet of the latter constituting one of the principal sources of the Waitaki.

This range terminates with a low *névé* saddle, from 7500 to 8000 feet high. An isolated mountain, which I have named Mount Petermann, in honour of my accomplished friend Dr. Petermann, the eminent geographer, rises on its northern side and is also covered with perpetual snow.

Again, south of Mount Petermann, another remarkable break is observable, but my attempt to reach it was not crowned with success. My travelling companions, although willing to follow me anywhere, were not experienced in glacier travelling, and, as I wished to avoid the possibility of any accident, being unwilling to risk the life of another, I had to return when only a few miles from the pass.

The Southern Alps, south of this latter col, begin to reach a still higher mean elevation, the snow and *névé* fields gain in extent, and give origin to the largest glaciers of our Alps. A remarkable cluster of mountains is here assembled round a common centre, to which latter I gave the name of Mount Elie de Beaumont, and which, unlike the other Alpine giants, has not only soft outlines, but is everywhere covered with a uniform sheet of snow, and consequently does not show one single rocky spot either on its sides or summit. This system gives rise, as before stated, to glaciers of great extent, the outlets of which on the eastern side form some of the most important tributaries of the rivers Godley and Cass, falling into Lake Tekapo, and of the river Tasman, forming Lake Pukaki.

I observed no col of any consequence in this stupendous chain, the average height of which may be estimated at 10,000 to 11,000 feet, and which terminates in Mount Cook, or Ahraraigi (Piercer of Heaven). The latter not only rises very remarkably above all the other snowy giants but is still more conspicuous, from the fact that at its western side also it is separated from Mount Stokes by a steep col, about 7000 to 8000 feet high, well visible from the Hooker and Mueller glaciers.

On the south-western side of this col the New Zealand Alps rise again to a great altitude, Mount Stokes being not much inferior to Mount Cook. They continue towards the south-west, under the name of the Moorhouse range, to Mount Holmes, where they divide into two branches, of which the western one, under the appellation of the Hooker and Gray ranges, continues to the southern bank of the river Haast, so named by order of the Provincial Government of Canterbury; whilst the eastern branch, under the names of the Ritter range, Mounts Ward and Brewster, strikes in a southerly direction to the remarkable break in the Southern Alps, which I discovered in January last, and by which I reached the west coast.

As this fissure or pass is perhaps unique in physical geography, I take the liberty to copy from an official report what I have said about it:—"Twenty miles above the mouth of the Makarora at Lake Wanaka, the river enters the fissure, coming from the east as a deep chasm of vertical cliffs from the central chain, and showing there the semi-opaque bluish colour which betrays a glacial origin. The rent still continues in the same direction, a tributary which I have called the 'Fish-stream' flowing through it and joining the Makarora. After travelling half a mile, we found it impossible to proceed up the bed of this stream, vertical cliffs rising abruptly from the edge of the water, which falls down over immense rocks. We were therefore obliged to ascend to a considerable altitude on its eastern bank, and to continue our journey through dense bush along the steep sides of the mountains.

"After travelling for 3 miles, partly over very rugged ground, we again met the 'Fish-stream' coming from the west, and still flowing in a deep and rocky channel; but observing still the opening before us, we again went forward in the same direction, and arrived in another mile on the bank of a very small watercourse, which we followed for about a mile.

"Observing that its banks consisted of débris, about 15 feet high, sloping as it seemed to me to the north, I ascended and found to my great satisfaction that the level of the swampy forest had really a slight fall in that direction; soon the small waterholes between the sphagnum (swamp-moss) increased, a small watercourse was formed, which ran in a northerly direction, and thus a most remarkable pass was found, which in a chain of such magnitude as the Southern Alps of New Zealand, and where no break or even available saddle occurs throughout their course north of this point in our province, is probably without parallel in the known world.

"After three observations on this pass, calculating the average stand of the barometer at the sea-level, and the altitude of Lake Wanaka, 974 feet, as given by McKerrow of Otago, with which my own observations closely correspond, the altitude of the pass is 1612 feet above the level of the sea, or 638 feet above Lake Wanaka. As before stated, there is properly speaking no saddle over which a traveller has to go, being only obliged to cross from one watercourse to another, ascending a bank of about 15 feet of loose shingle thrown across the rent, and arriving on a flat of very small slope, covered with open forest, which in half a mile brings him to another small watercourse flowing north. I may here add that at this point the mountains on both sides reach their highest elevation, being covered with perpetual snow, and glaciers of large extent."

Both chains unite again in Mount Stuart, on the western side of the remarkable pass referred to, and continue without interruption in the same south-west direction towards Mount Aspiring, the southern boundary point of our Alps; but it is nevertheless true, that the Southern Alps on the western side of this break begin to lose their continuity, being generally broken in sharp pyramidal peaks with deep but generally inaccessible saddles between them. Such a saddle, for instance, we observed at the head of the Young, one of the tributaries of the Makarora, north of Mount Alba, and which, according to Maori tradition, was used formerly to reach Jackson's Bay.

The dense covering of forest in the valleys, and of sub-Alpine and Alpine vegetation on the mountain-sides, has hitherto impeded the exploration of every valley to its head in the central chain, so as to be certain that no other passes available for mountaineers remain to be discovered; but I must state my conviction that for the general intercourse between the eastern and western sides, so far as is at present necessary, the pass at the head of the Hurunui and Taramakau, in the north of the province, and that at the head of the rivers Makarora and Haast, in the south, will at present be quite sufficient. The engineers of the Provincial Government of Canterbury have nearly finished a bridle-track over the first-named pass to the mouth of the Grey, which will in course of time be changed into a road for carriages and drays. The steep slopes of the Southern Alps are situated on the western side, whilst on the eastern, large lateral chains often little inferior in altitude to the main chain, but mostly running in a north and south direction, branch off from the principal systems.

In a line parallel with the direction of the Alps, we meet with a series of remarkable lakes following the direction of the large valleys. It would lead me too far, were I to enter at full length into the causes of their formation, which prove, by the enormous moraines by which they are surrounded or to express it still better dammed up, to be of glacial origin; and I think that nowhere in the temperate zones such clear signs of the glaciation of a large district, in the postpliocene period, are to be met with as in the New Zealand Alps.

The moraines are as clearly defined, and the angles of the large blocks of which they are composed as sharp and fresh as if they had only been deposited during the last few years, and we can easily follow the large and generally straight shingle-river valleys above them, which are sometimes 3 miles broad, and have an average fall of 40 to 50 feet in the mile, till we arrive at the present glaciers, of which the principal still have often an average breadth of 1½ mile at their terminal face, and present us with most remarkable phenomena. No link is missing to show us that the formation of these magnificent Alpine lakes is due to the former extension of the present glaciers, which now form the feeders of these lakes, and we can follow the former lateral moraines to the altitude, where, in the glacial period, an uniform sheet of ice covered these mountain masses, which during a period of great submergence remained alone elevated above the sea.

It is evident that a mountain chain of such altitude, and covered with such enormous masses of perpetual snow, must give rise to extensive glaciers; the more so as the insular climate of New Zealand is of a very moist nature, almost every wind bringing rain, or in higher altitudes snow, in its Alpine regions.

Amongst the glaciers,* the great Tasman glacier is the most important, its length being 12 miles, whilst even at its terminal face its breadth is 1¾ mile. It is the glacier which reaches lowest in New Zealand, as its extremity lies only 2772 feet above the level of the sea. The terminal face is easily accessible, even for horsemen, when once they have fairly come into the river-bed above the delta swamps, which, for about 6 miles above its entrance into the lake, fill its whole valley.

It was with great difficulty, when travelling up it, that I found my way through the old lateral moraines, lying on the eastern side above the drift formation; the passage being barred by enormous masses of huge blocks, over which it was difficult even to lead a horse. For several miles upwards the great Tasman glacier is entirely covered by moraines of great depth. No visible stream flows from its terminal face, all the water

* Dr. Haast sent to the Society a number of well-executed water-colour drawings representing the Alpine scenery of the Canterbury Province, and the following descriptions of glaciers are compiled from his explanations of the different views.—ED.

disappearing instantly between the great masses of large boulders of its terminal moraines. Only at one spot, in the centre of the terminal face, is the ice visible; but we find above it, on the glacier, a channel where, in weather favourable to the melting of snow or during heavy rainfalls, a great body of water flows, with which, below the terminal face, a large channel in the river-bed, usually dry, corresponds.

The main body of the Tasman River finds its exit on the eastern side of the glacier, about 200 yards above its terminal face, from a number of caves and fissures, joining the large outlet from the Murchison glacier, which had already washed its eastern side for more than 2 miles. The river meanders through its valley, here 2½ miles broad, in at least 20 channels; it has a great body of water, but in fine weather is easily transitable on horseback by any one having knowledge sufficient to select the fords.

To its junction with the Hochstetter glacier, descending in a deep valley between Mount Cook and Mount Haidinger, this glacier (the great Tasman) has only lateral moraines, but after the junction a large medial moraine is formed which very soon covers the whole glacier; only here and there large hollows filled by pools of water of a deep blue colour, and often of large extent, being 200 to 250 feet deep, betray in their perpendicular walls the existence of ice. An interesting feature is here revealed, showing that the glacier as soon as it finds an opportunity to expand itself, does so, by pressing its masses into the broad valley of the Murchison glacier, the terminal face of which lies about 1½ mile distant from the lateral edge of the Tasman glacier, which afterwards is, as before stated, continually washed by the outlet of the smaller one.

For 3 miles from its terminal face upwards, the outlet of the Murchison glacier flows along the eastern side of the Tasman. This lies in a valley, 1¼ mile broad; but it does not reach the Tasman, its terminal face lying 2 miles from it; and we may attribute the fact that it melts before it reaches the other, to the circumstance that it is more exposed to the sun, and that it is not like the Tasman glacier entirely covered with enormous moraines. But appearances show very clearly that the Murchison advances rapidly towards the Tasman glacier. In fine weather the outlet of the former runs on the eastern side of its broad shingle valley; but there is every proof that in heavy freshes the whole valley is entirely covered by the rushing waters of the Murchison outlet, which must contribute in no small degree to destroy the main glacier.

Two other glaciers of large extent are the Classen and Godley glaciers. The former descends from the nucleus of mountains which I have called Mount Elie de Beaumont, whilst the last-mentioned (the Godley) brings down the principal icy masses from Mount Tyndall. The terminal face of the Godley glacier is 3583 feet, that of the Classen glacier 3528 feet above the level of the sea. The former would descend much deeper into the valley, did not the outlet of another glacier wash and undermine the terminal face, and thus destroy it bodily, an instance of which I observed after a heavy fresh, when large blocks of ice were washed down the river for several miles. The lateral moraines of both glaciers reach within 30 to 40 yards of each other, and there is no doubt that as the glaciers are advancing they will soon meet, and then present a glacial face of 3 miles, the Godley glacier being at present at its terminal face $1\frac{1}{2}$ mile and the Classen glacier, $1\frac{5}{8}$ mile broad. The valley, 4 miles below the glacial cave of the Classen glacier is 2 miles broad, covered with shingle, over which the turbid waters of the river rush in many branches.

On the 5th of March, 1862, crossing the river at this spot early in the morning, after a freezing night, I met with only 5 branches which could possibly be passed on foot by an energetic and strong man; but when returning in the evening, after a hot and cloudless day, there were 16 branches, some of them so rapid and deep that even the horses had some trouble to stand the force of the current.

The Classen glacier is advancing, some old moraines overgrown with a luxurious vegetation being already half enveloped by the blocks of rocks thrown down upon them. Both glaciers are very much covered by moraines. The great Godley glacier fully deserves its appellation of the New Zealand "mer de glace," it being at the junction of its western tributary more than 2 miles broad.

About 3 miles below the terminal face of the Macaulay glaciers, on the slopes of Mount Forbes, large glaciers of the second order are situated, which, ending abruptly, send down two very fine waterfalls of about 800 feet high, which, after the melting of the snow, heavy rain, or other favourable circumstances, offer a wonderful sight. The main glacier has the peculiarity that it expands in a fan-shaped form, crevasses running towards a common centre, which may be placed where the glacier passes between two buttresses of rock. It is remarkably free from moraines. Another large glacier descends from Mount Forbes in a narrow gorge, and with a steep incline. The altitude of the glacial cave of the main glacier is 4375 feet above the sea-level.

I must not omit to mention two other glaciers also of large extent, the Hooker glacier, so called in honour of my distinguished friend Dr. Joseph D. Hooker, descending from the south and south-western slopes of Mount Cook proper, being enlarged by several branches from Mount Stokes and the Moorhouse range; and the other opposite to it, the Mueller glacier (so named in honour of my eminent friend Dr. Ferdinand Müller, of Melbourne), descending from the south-western slopes of the Moorhouse range. The glacial cave of the Müller glacier lies 2851 feet above the sea-level.

The rest of the glaciers do not attain such large dimensions, although some of them are still 500 yards broad, and deserve a few words of description.

The Ashburton glacier, main source of the river Ashburton, descending from Mount Arrowsmith, is one of these. The altitude of its terminal face is 4823 feet above the level of the sea. It was discovered and visited by me in May, 1861. About 300 feet below the present extremity of the glacier an old moraine stretches across the valley. The mean altitude of the range is about 10,000 feet; it consists of a large series of alternating palæozoic sandstones and slates, standing vertically, or at least at a very high angle; their disintegration has given rise to the formation of numberless peaks, needles, and pinnacles. The Ashburton glacier is one of those few New Zealand glaciers of the first order which are pretty free from any moraine, except a ground moraine.

There is an umbelliferous plant very abundant here and peculiar to the Alpine scenery of New Zealand. It is called by the shepherds "bloody Spaniard" (*Aciphylla grandis*, Hook. fil.), its leaves being very pointed like a poniard, exceedingly hard, and often 3 ft. long. My party, both men and horses, suffered greatly from its punctures, body and limbs being covered with blood when working our way through it.

Another of the smaller glaciers is the Clyde, main source of the river Clyde, which is again the main branch of the river Rangitata. Its terminal face is 3702 feet above the level of the sea. The glacier, the main body of which descends from a valley to the left of the spectator from Mount Tyndall, is entirely covered by a moraine, and the ice is visible only at a few spots, where the glacier forms step-like terraces. At its terminal face it is 1300 feet broad and about 100 feet high, and is therefore only of small size in comparison with others in our Alps, but does not fail nevertheless to be attractive to the visitor, as not only is the glacial cave high, and the deep azure tints of great effect, but the vertical walls of ice, about 120 feet high, also present us with a spectacle worthy of admiration.

During my visit in April, 1861, I observed in this vertical wall, about 30 feet below its débris roof, a round hole through which a little streamlet fell like water from the gutter of a house. This glacier is difficult of access, because the river issuing from it, setting often against perpendicular cliffs, can only be crossed after a continuation of fine weather and then only on horseback by men free from giddiness.

Amongst the different Alpine lakes of the province of Canterbury, Lake Pukaki is without doubt the most picturesque. It lies 1746 feet above the sea, is 10 miles long and 4 miles broad, and its formation is one of the most interesting objects which can be presented to the geologist and physical geographer. Nowhere, so far as my knowledge extends, are the proofs so convincing that it has, like similar lakes in other Alpine regions, been formed by the retreat of an enormous glacier. But it may truly be stated that the view from its shores towards its sources will rival in beauty and majesty any known views in the world.

In the centre, Mount Cook, resembling a large white tent, rises above the other ice-clad giants, of which Mount Stokes and Mount Sefton to the south, and Mount Haidinger to the north, are the most conspicuous. The bed of the river Tasman, nearly as wide as the lake itself, continues for 23 miles in a straight line to the base of Mount Cook; here dividing into two branches, of which the eastern one is the broadest and most important. In this main branch, 2 miles above the southern foot of Mount Cook, terminates the great Tasman glacier, the largest of all New Zealand glaciers. On both sides the ranges present us not only with *roches moutonnées*, but also with terraces cut into the rock, sloping down at such an angle that their fall can be accurately measured (from $1\frac{1}{2}$ to 4°).

VII.—*Expedition to the West Coast of Otago, New Zealand; with an Account of the Discovery of a Low Pass from Martin's Bay to Lake Wakatipu.* By JAMES HECTOR, Esq., M.D., Provincial Geologist.* (MAP, p. 56.)

Read, December 12, 1864.

ON the 20th of March, 1863, I represented to his Honour the Superintendent that I was desirous of extending the Geological Survey of this province into the West Coast district during the following winter, and suggested that a small sailing-vessel should be placed at my disposal for that purpose. My proposal was willingly acceded to, and a schooner-rigged yacht called the *Matilda Hayes*, of 20 tons register, was selected for the service. A light whale-boat was also built for the service at Port Chalmers, 21 feet in length, so that it could be taken on the deck of the schooner.

---

* Abridged from the original Report in the 'Otago Provincial Government Gazette' of November 5, 1863.

On the evening of the 20th May we sailed from Otago Heads, with a fair breeze from the north-east, but it died away during the night, and till the evening of the 24th we drifted slowly along with only light but favourable puffs of wind. The weather during this time was delightful, and there was nothing in the clear warm air, richly tinted sky, and delicate veil of haze that hung over the land, to remind one that it was only a month from the shortest day. At night the sea was rendered brightly phosphorescent, principally by swarms of minute *ciliagrade medusæ.*

A constant current sets up this part of the coast to the northward, and is stated in the 'N. Z. Pilot' at from 1 to 1¼ mile per hour. This may be the case close in shore, but as our course lay 7 miles from land, we did not find it to exceed ¼ mile per hour. When anchored in the channel within the bar at the Heads, the current was found to run at the rate of 2¼ knots per hour alternately with the ebb and flood tides, and the temperature of the ebbing waters to be 1° Fahr. lower than that of the flood, this difference being constant both with day and night tides, the ebb being 50° and the flood 51°. When 6 or 7 miles from land, the temperature was, however, constantly 51°.

During the 24th there were signs of stormy weather brewing in the south, so that we hugged close to the land between the Nuggets and Tautuku Bay. The coast here is picturesque, being precipitous with numerous indentations. The cliffs, which rise to an average height of 270 feet, are composed of stratified rock, dipping to the north-east, with from 12° to 20° inclination to the horizon.

On the 25th I landed in Riverton Harbour, and engaged the services of a native crew to accompany the Expedition in one of their large sealing-yawls. I moreover engaged a native seaman named Henry, who was strongly recommended as being well acquainted with the West Coast. I was detained in Riverton, bargaining with the Maoris and by other delays, until the 11th of June. Riverton Harbour is not suitable for a vessel of more than 100 tons, as the river is too narrow to permit a large craft mooring with the strong currents that set with both the ebb and flood tide. That with the ebb ordinarily runs at 4 knots per hour, and is greatly increased during freshets.

At 9 A.M. on the 12th June we crossed the bar, just at full tide, the depth of water being 7½ feet. On quitting the roadstead, which is that portion of the bay sheltered from the west by Howell's Point, we found it blowing a stiff breeze from the W.S.W. This wind suited us very well, as my object was to reach Port William in Stewart's Island, there to await the first easterly breeze we might have.

The coast of Stewart's Island is bold but not precipitous, and thickly wooded to the water's edge. There are several snug nooks in which vessels can anchor safely; and in one small bay off a stream, named in the chart Murray River, we saw two large vessels lying in shelter. I remained two days in Port William, sounding, dredging, examining its shores, and getting the data for a more detailed plan of it than is given in the Admiralty chart.

As we gradually lost sight of Stewart's Island, in departing on our course to the west coast, it became wreathed in dark tempestuous clouds; while before us, over the valley of the Waiau River, the twilight was clear but lurid. Partly sailing and partly towing we passed the white cliffs of Chalky Island, which remind one of the Isle of Wight; and rounding the Garden Islands at 11 A.M., soon after anchored in the capacious and land-locked harbour of Southport.

The south end of the port is named Lee Bay, the shore being exposed to the north-west gales. The beach there is shingly, and rises 50 feet to a level and finely timbered flat, on walking across which for a distance of 1½ mile I came out on the shore of Preservation Inlet. The extent of this level neck of land between the two inlets does not exceed 1000 or 1200 acres in extent. The flats are covered with a fair growth of timber, comprising red, black, and a few white pines, totara, mapau, iron-wood, carmachia, birch, and many other trees of the southern parts of the province. Excepting the supplejacks in a few places, the forest is quite open, and much more easily traversed than I expected. It is the shrub-growth around the shores which is so remarkable for its beauty and diversity. No artificial arrangement could effect the rich and graceful variety of some of the natural groups of shrubs that clothe the little headlands and rocky islands. It is probable that the Garden Islands were so named from their excelling in this respect.

At 3 o'clock in the afternoon of the 22nd of July, we were off the south entrance to Dusky Bay. It was quite dark when we passed Breaksea Sound, the night being mild and fine, with a light southerly breeze. The sea was brilliantly illuminated with large fiery masses, which proved to be compound *polyps*, forming tubular masses sometimes 12 inches in length and 2 in diameter.

The breeze continued favourable until daybreak, when it became calm, the air being deliciously fresh and mild. When off Nancy Sound, at a distance of 7 miles from the shore, we had a panoramic view embracing the whole coast from Milford Sound to Dusky Bay. Its aspect is gloomy and forbidding in the extreme. The black mountains rise abruptly from the water's edge, with a slope rarely less than 25°, and often 50° to 60°, but not forming sheer precipices. The walls of the Sounds are equally abrupt, and it is obvious at the first glance that they cannot have originated as arms of the sea, or be due in any degree to its erosive action;

their most protected angles and nooks having the same abrupt and still outline that characterises the seaward slope. The view from the summit of a range of mountains—when a mantle of clouds conceals their base and wells up into all the valleys and ravines—has been likened to their partial submergence beneath the sea; and to convey a correct impression of the appearance of this coast, I need only reverse the simile, as the hard outlines and profound valleys, which we are accustomed to see only at considerable elevations, have been here reduced to the sea level.

We remained nearly stationary till 1 P.M., when the wind shifted to the north-west, and clouds began to gather on the mountains, warning us to take shelter, so that we put back to Thompson Sound, which was 7 miles to the southward, as it could be most easily entered with the wind from this quarter, and moreover, affords a more secure anchorage than Nancy Sound, to which we were opposite. The wind carried us right into the Sound, but then failed us, so that the boat had to be launched, and the yacht towed up to the anchorage in Deas Cove, a distance of 3 miles. We were hardly anchored when the storm from the north-west broke, and in a few hours acquired great violence—the gusts of wind drawing through the narrow mountain valley having terrific force, and accompanied by torrents of rain. This storm, which continued for 3 days, was the most violent we had had on the coast, the gusts of wind having such strength that though we lay in a land-locked cove, it was found necessary, besides putting down two anchors, to moor the craft to the trees. The rain was incessant and very heavy, as much as 8 inches falling in 48 hours.

On the 28th we took advantage of a moderate breeze to sail up the Sound. The scenery is very remarkable. The mountains have an average height of 2000 feet, and a few peaks rise to 4000 or 5000 feet. For several thousand feet above the water-level, and probably far beneath it, the rock has been smoothed and planed down by the ice action.

On the 5th of August we passed into Doubtful Inlet, after several days' detention in the narrow arms of the Sound, and a favourable breeze soon carried us again to Thompson Sound. On the right side of Doubtful Inlet I found a snug little cove, not particularly marked on the chart, where there is a convenient anchorage for vessels not drawing more than 10 feet water. If we had known of this place it would have saved us several days, as we should not have required to take the schooner up to the head of Crooked Arm, from which we had found it difficult to escape again.

We sailed next morning for Milford Sound, which is distant 40 miles to the north. Until nightfall we made but little progress, but by daybreak next morning we were off the entrance. The scene was magnificent as the sun rose and slowly lighted up the inequalities of coastward slope, and so threw back the mountains in their true proportions and full grandeur. At dawn they had looked rather insignificant, their sharp serrated crests seeming merely to form a summit of a dark wall rising close to the water's edge. These mountains have a different aspect from those further to the south, for instead of solid cubical masses bounded by mural cliffs, they form groups of peaks joined by narrow ridges, and throw off sloping spurs towards the sea. The highest mountains almost overhang the sound on either side—Pembroke Peak on the north having a rounded summit covered with perpetual snow, and the Llawrenny Peaks to the south being also snow-clad. It was 11 o'clock before we passed Fox Point, which is the south headland, as at that time in fine weather the breeze commences to blow up the Sound from the seaward. Three miles from the entrance of the Sound it becomes contracted to the width of ½ mile, and its sides rise perpendicularly from the water's edge, sometimes for 2000 feet, and then slope at a high angle to the peaks that are covered with perpetual snow. The scenery is quite equal to the finest that can be enjoyed by the most difficult and toilsome journeys into the Alps of the interior, and the effect is greatly enhanced as well as the access made more easy by the incursion of the sea as it were into their alpine solitudes. The sea, in fact, now occupies a chasm that was in past ages ploughed by an immense glacier, and it is through the natural progress of events by which the mountain mass has been reduced in altitude that the ice-stream has been replaced by the waters of the ocean. The evidence of this change may be seen at a glance. The lateral valleys join the main one at various elevations, but are all sharply cut off by the precipitous wall of the Sound, the erosion of which was no doubt continued by a great central glacier long after the subordinate and tributary glaciers had ceased to exist. The precipices exhibit the marks of ice-action with great distinctness, and descend quite abruptly to a depth of 800 to 1200 feet below the water-level. Towards its head, the Sound becomes more expanded, and receives several large valleys that preserve the same character, but radiate in different directions into the highest ranges. At the time that these valleys were filled with glaciers a great "Ice Lake" must have existed in the upper and expanded portion of the Sound, from which the only outlet would be through the chasm which forms its lower part. Two hours' sail brought us into a fresh-water basin, where we anchored. Two streams of considerable size enter the head of Milford Sound, the Cleddau River from the S.S.E., and the Arthur River from the south-west. A well timbered flat about a mile in extent lies between them, which has been principally formed by the materials brought down by the first-mentioned stream, consisting of shingle and stratified sands. It is evidently a river-valley deposit, and its surface slopes up the valley of the Cleddau River, forming benches 4 to 6 feet above the highest floods. This flat (and a few hundred acres on islands in the lower part of the Arthur River) is the only land at the head of Milford Sound that could possibly be made available for any purpose.

Below the narrow part of the Sound around Anita Bay there is another small portion of level land, but it is a mere strip by the water's edge along the base of steep ranges of hills. Fresh-Water Basin, in which we were moored, is an expansion of the main channel of the Cleddau River lying between the before-mentioned flat and a vertical precipice of rock, but closed in from the up-Sound winds by Cemetery Point. We lay within a few hundred yards of the foot of a cascade 540 feet in vertical height. The grand scale of the surrounding scenery detracts, however, from the imposing effect which this fall would have in any other situation. The volume of water is very considerable, especially after heavy rains, forming a stream for 100 yards between the foot of the fall and the edge of the sea 40 feet in width, and, judging from the flood-mark, sometimes 18 to 20 feet in depth. The occasional flooding and the continued dashing of wind and spray from the falling water have prevented the growth of scrub on a small plot of about an acre in extent, which from a distance presents the pleasant, because unusual, sight on this coast, of a grassy knoll. The surface of this plot is covered with hummocks, not unlike graves, which doubtless has suggested the name Cemetery.

On the 10th August the weather promising well in the forenoon, I started on an exploratory journey up the valley of the Cleddau River; but in the afternoon it began to snow heavily, so that I had to return after getting about 5 miles from the mouth. The valley has a very rapid fall, but it is crossed by no ledges of rock or other obstacles than the large boulders derived from ancient moraines with which the valley is partially blocked up. The floor of the valley is composed of the detrital matter, the rock only showing at the sides, where it forms steeply-inclined slopes grooved and scratched like those of the Sound. Three valleys join to form the main valley of the Cleddau River, but they all seem to originate among precipitous mountains, and give no hope of an easy passage to the eastern side.

On the 17th August, there having been several days of fine weather, with south-east wind, I made another attempt to examine the Cleddau River, taking with me three men, a tent, and provisions for some days. The woods were very dry and pleasant, and the stream so much lower than during the previous week, that we were able to skirt it in many places where I had previously to wade across it.

Following up the middle of the three branches, by evening we had made about 8 miles—the latter part of the journey being very rough work on account of the great size of the boulders which block the channel, and over which we had to scramble at the risk of slipping into the torrent; this did happen to two of the party, but fortunately with no worse result than a thorough drenching in the icy water. The fall of the river is very great; and the bed of the stream is everywhere composed of glacier *detritus*, sometimes rudely stratified, and filling the valley to the height of 1500 feet above the sea level, the immediate river-valley being excavated between this accumulation and the steep, smooth wall of rock against which it rests.

Next day we followed up one of the branches to its source. The upper part of its valley is cut, to the depth of 540 feet, through a true moraine consisting of earthy clay, and containing regular blocks of rock of all sizes up to 30 and even 40 feet in diameter. The stream ends quite abruptly against a glacialised surface of rock, which slopes to a height of 3000 feet, at an angle of from 30° to 40°. The snow which falls from the mountains is unable to lie on this polished surface, and, sliding down, wedges in at the back of the moraine, forming a miniature glacier, though without the true ice structure, at an elevation of only 1000 feet above the sea-level. The depth of the groove, which has been cut by this snow-bank between the rock and the moraine, is not less than 400 feet.

By a slightly-dangerous climb we got up the glacialised surface of the rock, and on to the top of the great moraine which is heaped up against it. The frequent landslips which take place from the face of the moraine-cliff do great havoc among the trees that grow on top, leaving their roots bare, so that they die, and are easily thrown over. The forest is very open, and some of the trees are of good size. The principal trees which I observed at an altitude of 1800 feet were the black-birch, the iron-wood or batta, the remu, totara-cedar (a second species of *Podocarpus*), broad leaf, New Zealand holly (*Eurybria dentata*), moka, and several others.

At this altitude, on westerly exposures, there are few lichens or mosses, as the woods are well aired and the soil dry. We were now in the third great longitudinal valley, which runs north and south, crossing the main valley, which is continuous with that of the Sound. As these valleys conform to the trend of the strata, they probably indicate lines of softer rock along which the erosion was more easily effected by the descending glaciers. In these valleys the moraine matter is heaped principally on the eastern side, being opposite to that upon which the greatest accumulation of ice must always have taken place.

Although the mountains rise so precipitously from the valleys, they are not so steep towards their summits, where there is generally a large area presenting slopes on which snow could rest under circumstances favourable for its accumulation, and form the source of glaciers which would descend into the lower valleys. Pembroke Peak (6623 feet) is covered with perpetual snow, which on its south-east face extends as low as 4000 feet, with a slope of 20° to 30°, and there terminates in a cliff of true glacial ice, judging by its intense blue tint compared with that of the surrounding snow; and did it not overhang a precipice, this ice would doubtless descend as a glacier to a very low altitude. Now the average height of the mountain-ridges is nearly 6000 feet, and with the present conditions of climate, an elevation of the land equal to 2000 feet would, according to the best estimate I can form, raise about six-tenths of the area of this mountain district to that altitude, which is certainly considerably above the snow-line in the strict sense; that is the line above which the snow never disappears during the summer, unless by gravitation after assuming the glacier form by regelation.

It is a mistake to estimate the size of glaciers generated from a mountain-range merely by its altitude, as it is truly the area which in the district is elevated above the snow-line that determines their extent. If this be the case, the area must always be diminishing rapidly from the eroding action of the descending ice, and therefore the extent of the glaciers must also diminish. Judging from the structure of the sounds on the west side of the mountains, and that of the lake district on the east side, I am inclined to think that the opposite sides of this mountain-range have undergone repeated and alternate oscillations to the extent of at least 1000 feet in either direction from a nominal point; and that the western district being at present near to the period of greatest depression, the re-elevation of the land to the other extreme would be almost sufficient to extend the glaciers to their ancient limits, for the residual excess of cold to effect this could easily be accounted for by the necessary alterations in the physical geography of the country which would accompany such re-elevation. The immense lapse of time and the number of secular returns of these conditions is well shown by the remains of the high-level valleys, which were the wide channels for glaciers of earlier date, but are now represented as fringing shelves along the sides of more profound valleys, just like the terraces skirting the valley of a river which is changing its course from side to side of a gradually deepening channel.

From the altitude we had attained I could see that there was no hope of finding a saddle at the head of this valley, whereby communication could be had with the inhabited districts on the east side. All further progress appeared to be barred by precipitous mountains 5000 feet in height, with detached snowy peaks several thousand feet higher. As the weather was very threatening, we made our way back to the camp of the previous night, and regained the schooner next day during a violent storm, with rain from the south-west.

On the 24th August I left the head of Milford Sound, and dropped down to Anita Bay, where we anchored at dark; and next morning, at 4 A.M., taking advantage of the land-breeze, sailed to the northwards to the Awarua River, which is laid down on the chart 18 miles further up the coast. After making 6 miles, the wind died away when we were off Yates' Point, which is the first promontory to the north of Milford Sound.

As the yacht lay becalmed, with too heavy a swell running to allow of our towing, and as it was necessary that the Awarua should be carefully examined before we attempted to enter it with the craft, I went on in advance with three hands in the whale-boat. Keeping close in-shore, I had a good view of the coast, and satisfied myself that it would be quite possible to get along it from Milford Sound northwards. The coast-line forms a succession of bold headlands, which generally have a group of sharp rocks, or a long reef extending from them to the seaward. Between these headlands are shallow bays, with steep sandy or shingly beaches, on which the surf breaks with tremendous violence. Three of these bays are of large size, each having a large valley extending from it into the interior in a southerly direction; and it is as flowing into the most northerly of these that the Awarua of the Admiralty Surveyor is laid down on the chart. The proper Awarua of the Maoris, according to all the information that I am able to collect, is, however, a large river that falls into Jackson's Bay to the north of that river, which I named the Jackson last summer, but which I have since learnt is known to the Maoris as the Terrewhatta.

After pulling 10 miles, and when opposite to the south end of the second bay, or Martin's Bay of the chart, we observed a smoke on the shore; and, on standing in for it, found it to be a party of Maoris, who made signs for us to land; but as the sea was breaking nearly a quarter of a mile from the shore, I dared not take the boat even within hail. Guided by the Admiralty chart, which hitherto I had found faithfully correct, I was making to the next bay to the north in search of the Awarua River, when our guide, who had been along this coast sealing, though he knew nothing of that river, thought that I was going too far, and that the mouth of the only large river he had ever heard of on the coast, into which there was a chance of taking a yacht, was at the northern extremity of Martin's Bay, as he recognised the long and dangerous reefs that lay before us. On making towards the north end of the sandy beach, which extends for 3 miles, we found a strong current against us, which quite confirmed this opinion. Still, however, when close in shore, we could see no appearance of an entrance, the surf seeming to break with increased violence where the sandy beach meets the rocks. Proceeding cautiously, and keeping a few boats' lengths from the rocks, we however found that this appearance was deceptive, and that there was really a pretty-wide channel lying between the rocks and the point of the sandspit; and pulling up against a current of two or three knots, a few hundred yards brought us into comparatively still water, when we found that we were in a large river about a quarter of a mile in width, the first reach of which extends for nearly 2 miles parallel with the sea-shore, and separated from it only by a narrow sandspit. After landing on a gravelly point, where there was an old Maori hut and a camping-place where tents had been pitched very recently, I lost no time in examining and making a rough plan of the entrance of the river; and having sounded carefully, set up guide-marks by which to bring in the schooner at once with next morning's tide should she arrive in the offing during the night. The channel is quite deep enough for much larger vessels, as there is 10 feet of water in the shallowest part of the bar; but it is very narrow, and there are five or six awkward sunken rocks on that side on to which the current would naturally tend to sweep a vessel. However, I anticipated no difficulty in getting the yacht in if we could only hit the proper time of the tide. Next morning, as we could see nothing of her in the offing, we pulled up the river against the ebb for a few miles, and were greatly pleased with the alluvial land, and the fine quality of the forest growth with which it is covered. Being afraid that the schooner might arrive in time for the evening tide, I did not go far up the river; and on returning to the sandspit at 1 P.M., we saw her at a distance of 8 miles to the south-west, but further from the land than where we had left her on the previous day. After lighting a large fire as a signal, it being then low tide, I was able to improve my plan of the entrance to the river, and fill in the rocks and channel more accurately than previously. The current was flowing out with great velocity, the clear channel at the turn of the tide being contracted to a width of 110 feet.

Next morning (the 27th August) there was a fine southerly breeze, and we were on the look-out for the schooner, but she was not in sight. However, at 8 A.M. we heard her gun fire round the point to the north, and immediately put out across the bar, it being then almost the turn of high-water. When they picked us up, after a pull of a couple of miles from the land, I learnt that the skipper, misled by the chart, had been sweeping the northmost bay all the morning in search of the entrance of the Awarua River, where he expected to communicate with me. He describes the bay as being very deep, with a bold boulder-beach, without any appearance of a river, and complained of the great risk he had run in being led to sweep so close in-shore in search of the river through the error of the chart, for, if a nor'wester had sprung up, he never could have beat out against it.

Early on the morning of the 28th I proceeded up the river, accompanied by the skipper, to see how far up it would be advisable to take the yacht. We had the advantage of the flood-tide, which carried us rapidly up; and, after a distance of 4 miles, we were surprised and delighted to find that it flows out of a lake 1 to 2 miles in width, and extending in a southerly direction for 10 or 12 miles. We had a fair wind up this lake, so that by noon we reached its upper extremity, where a considerable stream enters it from the S.S.E., and up which we were able to take the boat for nearly a mile. The lower part of this lake is comparatively shallow, varying from 6 to 10 fathoms, and surrounded by a large extent of level land, which is continuous with the flat through which the river winds, and is bounded on either hand by low sloping hills.

About 5 miles from its lower end it, however, acquires all the characters of one of the Sounds, being bounded by steep mountains that rise out of deep water. At the head of the lake there is a large flat, covered with thickets of the tutu, fuchsia, and other shrubs. This river is called by the Maoris the Wakatipu-kaduku, or the river that leads up to the Wakatipu Lake; by which they mean, not the Wakatipu Lake of the east side of the mountains, but the lake I had just discovered, and which, in order to avoid confusion, I propose to name the Kakapo Lake, in order to preserve the name of that rare and interesting bird which will, in all probability, soon become extinct; and preserving part of the Maori name, I would name the river Kaduku.*

Martin's Bay, into which the Kaduku River flows, is 4 miles across, between the two headlands, and rather less than a mile in depth. The best weather for entering the Kaduku River is after a few days of light N.N.E. or south-east winds, or with a light south-west wind if there has not been previously a gale from that quarter, as in that case there is sure to be a heavy swell, especially if the barometer is low. The most severe gales on the coast are from between N.N.E. and N.N.W., and not often from north-west, as is the case farther south, and on the whole these were the prevailing winds during the month's experience we had of the place. As the bay is open and the current sets strongly off shore to the south-

* The lake is called "M'Kerrow" on the official maps, and the river at the head of the lake "Hollyford."

ward, there would be little danger in a vessel anchoring in it for a short time in fine weather, to wait the proper time in taking the bar, as, if a northerly gale sprang up, she could easily reach Milford Sound with the first of it.

The dangers, however, which are incurred in entering the Kaduku River, are very great in its present condition, arising from the narrowness of the channel, the strength of the outsetting current (excepting at high water), and the exposed nature of the coast, on which there is nearly always a heavy swell rolling. Still, however, I believe it could be greatly improved, and would form at least quite as good a port as many which are freely entered by sailing vessels and steamers of small size on other parts of the New Zealand coast. If, however, an easy line of route be discovered to the interior of the Province from this point, this district—which is in itself of great interest—will obviously acquire a still higher importance, from its being the nearest part of New Zealand to the Australian and Tasmanian ports, so that in future times it may not improbably be a terminus of mail and telegraphic communication. In that case, for the convenience of large vessels, it would be necessary to have communication with Milford Sound, either by a system of lighterage, or overland, by road or railway, and thus render useful one of the most excellent harbours on the coast; the only defect of which arises from its great depth of water and small extent of available land on its shores.

A previous examination of the structure of the country between Kaduku River and Lake Wakatipu, left no doubt on my mind that the Southern Alps were traversed in this longitude by a depressed valley, similar in all probability to that recently described by Dr. Haast as leading from the head of the Wanaka Lake, and through which I might certainly expect to find an easy route between the east and west slopes of the island. This impression I communicated verbally at the time to his Honour the Superintendent, my only doubt being as to the exact place at which such a route would terminate on the coast. A statement, which I had heard, that Messrs. M'Kellar and Gun had seen the waters of Milford Sound, inclined me, though it was rather against my own theoretical views, to expect it to lead towards that point; but my examination of the valley of the Cleddau River, at the head of Milford Sound, had quite precluded any hope of a low pass in that direction. However, the view I had from Skipper's Range, above the east shore of Kakapo Lake, enabled me at once to recognise the proper line of route as lying up the valley of the Kakapo (or Hollyford) River; and further, from the Maoris we met on the coast, I learnt that, by travelling in that direction, several parties of natives had in former days migrated to the settlements on the southern part of the island. I tnerefore at once made arrangements for crossing the mountains and proceeding to Dunedin for the purpose of communicating with the Government, according to my promise, before the expiry of five months from the time the Expedition started. Accordingly, on the 23rd September, I left the yacht in the Kaduku under the care of the skipper, and took three men across the mountains with me, one of whom was Mr. Hutchinson, the owner of the yacht, and whose great desire to see the West Coast had induced him to ship as one of the hands.

The river has a width of from 80 to 100 yards, and winds through a valley which, for the first 6 miles, averages one mile in width and trends S.S.E. from the lake. At that distance from its mouth, it receives a branch 60 yards in width that forms the outlet of the Wawaihiwuk Lake* of the Maoris, a place that they visit periodically to catch eels.

The upper part of the Kakapo River, and its tributary the Wawaihiwuk meet from almost opposite directions, the former draining the southern and the latter the northern extremity, of a longitudinal valley which extends for about 40 miles with a general direction from north to south, having the Bryneira Mountains on the east and the Darran Mountains and Skipper's Range on the west; the drainage being effected between the two latter mountain groups through the Kakapo Lake. The shallows become more frequent and formidable above the junction of the two streams, and the valley is for a short distance narrowed by a range of low hills which project from the mountains on the south as if it were the remains of a barrier that had at one time closed the present outlet of the large valley. These hills, however, cause no obstruction, the river passing through them with an even channel, unbroken by falls or rocky ledges, and having flats or sloping banks on either side. At a distance, in a straight line, of 10 miles from the mouth of the river, where we arrived early on the second day, the channel was obstructed by the immense boulders of an ancient moraine, causing a violent rapid about half-a-mile in length, so that from this point I sent back the dingy. The Darran Mountains, which encircle the head of Milford Sound and form the west side of Kakapo Valley, have a striking appearance from this point, although from the profundity of the valley the higher peaks are completely shut out from view.

There is only one place where there is the slightest appearance of a gap in this range, but even there the saddle cannot be lower than 3000 feet. The high slopes above 5500 feet seem to be covered with perpetual snow, with glaciers of small size descending

* "Lake Alabaster" on the official maps.

through steep ravines as low as 3000 feet above the sea-level, but from the extent of bare rock from their lower extremity and the position of their terminal moraines, I am inclined to think that in some seasons they must descend about 500 feet lower.

Above the boulder-rapid just mentioned, the fall of the stream is again comparatively slight for 10 or 12 miles, at which place the valley is crossed by a second moraine, but in this part of its course, besides the frequent occurrence of shallows, its channel is much obstructed by drift wood, which is frequently piled to a height of 10 feet by floods. In some parts of the valley the flat land, which is of good quality and above the highest floods, is nearly 2 miles in width. The forest which covers the flats is very open and free from underwood, and contains some fine timber-trees. Above the second boulder-rapid, the rounded shingle fills the valley from side to side, so that the useful land may be considered to terminate at that point, or about 18 miles from the south extremity of the Kakapo Lake.

After losing four days by continued rain, which I was surprised to find only caused a rise of a few feet in the river, we reached a stream which descends from the saddle at the source of the Greenstone River on the morning of the 1st October, being then a distance of 25 miles from the Kakapo Lake, although by the route we had come, following all the bends of the river, we must have travelled 40 miles, as it occupied us eighteen hours exclusive of all delays.

I may state that the rise of the valley to this point I estimate at 400 feet, and thus far there would be no heavy gradients to be overcome in the construction of a road. After following up the Pass Creek for a short distance, and with an easy climb of two hours, we reached the top of a bald hill on the west side of the Greenstone Valley, being, I have no doubt, the same from which Messrs. M'Kellar and Gun obtained their prospect of the western slope, when in search of new pastoral country. We encamped near to the top of the hill, which is over 3000 feet above the sea-level, and at least 1400 feet above the highest point of the Greenstone Valley, or, in other words, just so much higher than it was necessary for us to rise in order to strike the waters that flow to the East. The bed of the stream which descends to the westward from the saddle is very precipitous, but on both sides of it there are spurs which lead easily down to the Kakapo Valley. Two lakes occupy the bottom of the valley where the water turns, separated by a mossy flat; the water from the north-west, which is half a mile in extent, forming the Pass Creek, while that of the South Lake, which is 2 miles long and half a mile wide, forms the Greenstone River that flows to the Wakatipu Lake. From the top of the hill I obtained a view of a second and even deeper valley, which I suspect leads through to the Mavora Lakes and is the route which has been frequently traversed by the Maoris, between the Wakatipu, Kaduku, and Riverton.

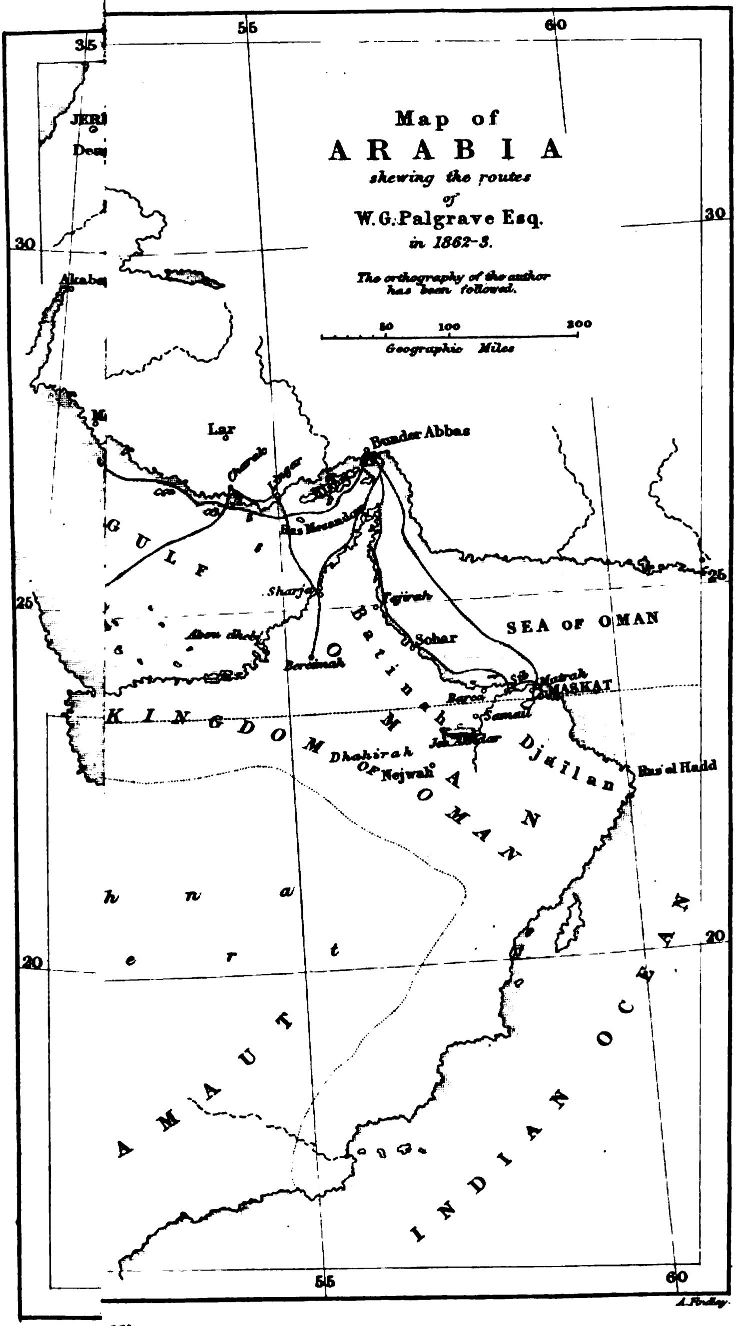
After two hours' walk along the ridge next morning in a south-east direction, we descended into the Greenstone Valley and reached my furthest camp of last April, and by nightfall got several miles below the point where we, on that occasion, left our horses. The descent of the valley of the west, or McKellar's branch of the Greenstone River, is very gentle and uniform, and the total fall from the McKellar Lake at the summit level to the Wakatipu Lake, a distance of about 22 miles, cannot exceed 400 feet.

As the lower part of the Greenstone River, for a few miles above where it receives the eastern or Caples branch, is obstructed by bush, I again followed McKellar and Gun's track by the Mararoa River, and next day reached the out-hut of Mr. Von Tunzelmann, situated on the Riverton track, 10 miles south-west of the Wakatipu Lake. The total distance from the Kakapo Lake to the Wakatipu Lake by the route I followed is 90 miles. But if we had followed straight up the Kakapo Valley, and followed down the Greenstone River to where it enters the Lake, which would be the proper line to cut a track, the distance would be less than 50 miles.

On the 4th October, I reached Queenstown, and from there sent back two men to clear the track I had "blazed" to the Kakapo Lake, and then return to the height of land and there await my arrival from Dunedin. Accompanied by Mr. Hutchinson I then proceeded by the ordinary route to the Dunstan, and thence by coach to this place, and had the pleasure of reporting my arrival to his Honour on the 7th instant.

I may state in conclusion that there will be no difficulty in constructing a road at a moderate expense between the Wakatipu and Kakapo Lakes that will pass over a summit-level of the mountains that does not involve a rise of more than 400 feet above the Wakatipu Lake, which, being elevated 1000 feet above the sea, consequently makes the western descent equal to 1400 feet, 400 of which may be accomplished with an imperceptible gradient.

NOTE.—The Secretary of the Gold Fields has placed in my hands a sketch-map of the country between the Kakapo and Wakatipu Lakes, which in all the main features is very correct, made by a miner named Caples, who states that he reached the sea at Martin's Bay in March last. From the statement which accompanies this sketch, Mr. Caples appears to have kept on the mountain-ridges, and to have followed routes that were unnecessarily difficult, and never to have entertained the idea that an easily practicable one existed; he, however, displayed extraordinary


Map of
ARABIA
shewing the routes
of
W. G. Palgrave Esq.
in 1862-3.
The orthography of the author has been followed.
50 100 200
Geographic Miles
Lar
Bunder Abbas
Ras Mesandim
Sharjah
Aboo dhebi
Berеimah
Sohar
SEA OF OMAN
Matrah
MASKAT
Barca
Samail
Djailan
Ras el Hadd
Dhahirah
Nejwah
KINGDOM OF OMAN
Batinah
INDIAN OCEAN
A. Findlay.
1865.

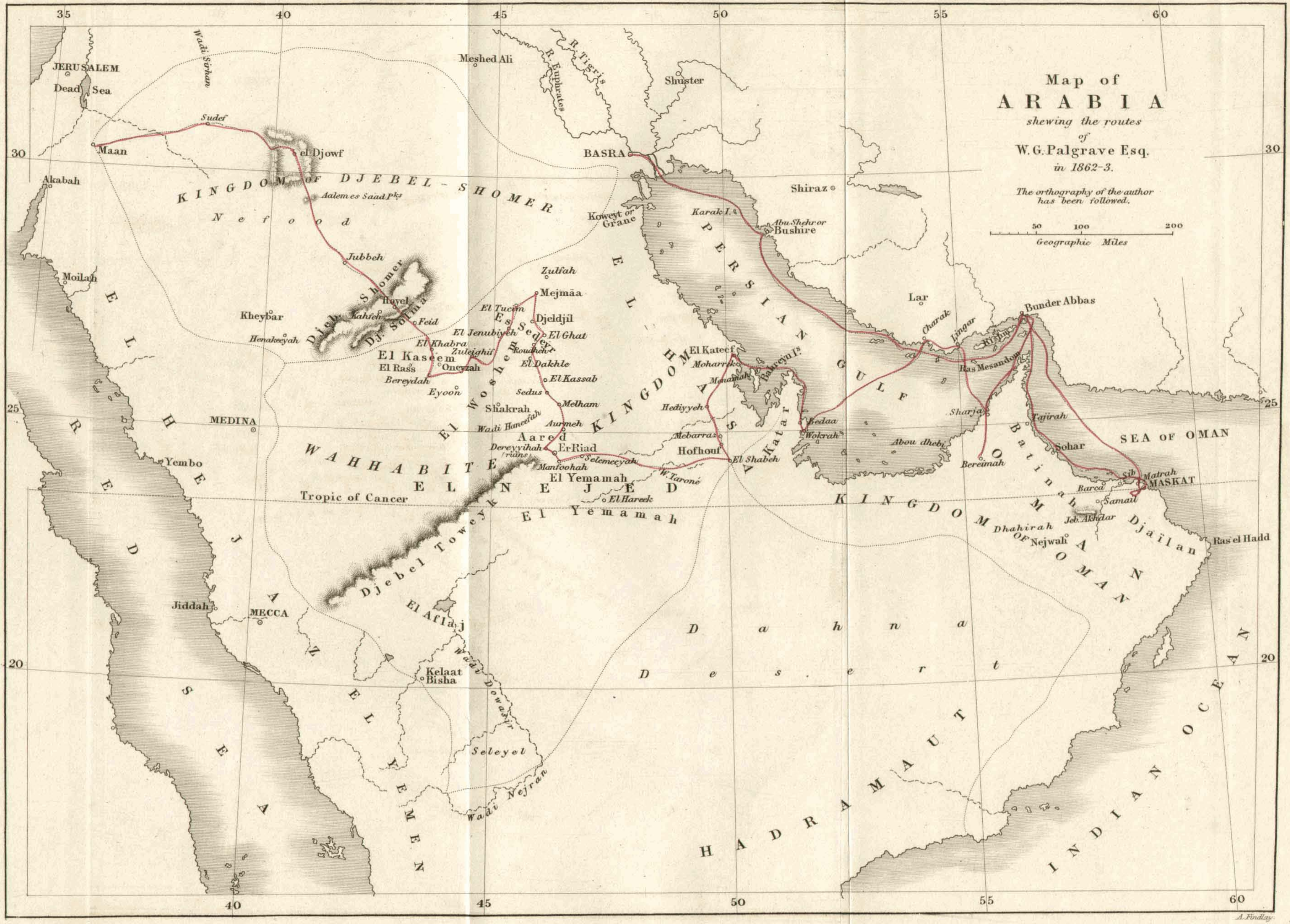
energy and perseverance to accomplish what he did, and I take the liberty of referring to these circumstances, as I think that every credit is due to him, for being the first to give any account of this previously unknown district. By comparing his sketch I recognise his McKerrow Lake as being the Kakapo Lake, and his Hollyford River and Pike's Creek as corresponding respectively to the Kakapo River and the Wawaihiwuk Creek mentioned in the foregoing narrative.

VIII.—*Observations made in Central, Eastern, and Southern Arabia during a Journey through that Country in* 1862 *and* 1863. By W. G. PALGRAVE, Esq.

Read, February 22, 1864.

A LINE of route which led me across the Arabian Peninsula from Gaza to Maskat, thus traversing the country in its greatest breadth, could not but afford special opportunities for observation both of the land and of its inhabitants. A few notes, the result of such observation, may not be unacceptable, while they contribute to fill up the blanks in our view of Arabia.

I am, indeed, aware that this very appreciation must be often imperfect, and on some points absolutely defective. This is mainly owing to the circumstances under which I undertook and carried out my investigations. For if, on one hand, my journey was conducted in a manner affording me ample leisure and great liberty for observation, whether personal or by means of inquiry from trustworthy sources; on the other hand, it was deficient in many conditions requisite for minute accuracy and absolute precision. Thus the medical disguise which I had assumed, for the greater facilitation of my project, succeeded indeed to the full in preventing or allaying native suspicion, and enabled me to visit undisturbed and at my ease many localities of special interest, and to stay in or near them so long as might be necessary for my purpose. It furnished me also with many convenient opportunities for asking questions and collecting knowledge about regions lying out of my immediate reach and off my path, without too much risk of thereby awaking the habitual distrust of the inhabitants, or displaying a dangerous appearance of over-curiosity. But this same disguise unavoidably deprived me of the means of taking with me any mathematical or geodesical instruments, indispensable to accurate observations, and no less of the freedom requisite for sketching or photographing, nay, often of even taking down on the spot notes however useful; while, at times, prudence rendered my interrogations and researches less precise and less frequent than I



Published for the Journal of the Royal Geographical Society, by J. Murray, Albemarle Street, London. 1865.

should have otherwise made them, for fear lest a marked appearance of inquisitiveness should belie the character of a native travelling-physician.

The districts which I myself visited in person were—1st, the Desert, as it lies from Ma'ān to the Djowf; my route was, however, somewhat different from Mr. Wallin's, and passed, for the most part, to the south of his. 2nd. The Djowf itself and its neighbourhood. 3rd. The route from thence to Djebel Shomer, following precisely Wallin's track, and next the town of Hā'yel, with a considerable part of the adjoining province. 4th. The route thence to the town of Bereydah in the Kaseem, and a large portion of that province also, with some of its principal towns, such as 'Oneyzah and others. 5th. The route from Bereydah to Sedeyr, and nearly the whole of the latter district. 6th. The province of 'Aared with its actual capital Er-Riad, residence of the Wahhabee monarch, as well as the now ruined town of Derey'eeyah, &c. 7th. Part of the provinces of Yemamah and Aflaj. 8th. The route thence, leading northward of the Hareek district to the town of Hofhouf, in the province of Hasa. 9th. A good part of that province, as well as Kateef and its neighbourhood. 10th. The islands of Bahreyn. 11th. Katar and the pearl coast. 12th. The town of Sharja, and the adjoining promontory up to Ras Mesandom, and thence southward through the Batinah as far as Sohar. 13th. The part of 'Oman adjoining Samaïl and Maskat, Seeb, &c. &c.

What information I may incidentally give on other points of the country not comprehended within these limits, is principally the result of question and answer between myself, the inhabitants, and the Bedouins. I ought, indeed, to except the sea-coast of the Hedjaz and Yemen, with which navigation had previously rendered me conversant.

In the present narrative I shall first, for clearness sake, say a few words on the geographical outline and main features of the Arabian Peninsula, and more especially of the Desert, its character, and its limits; a main object of this being to fill up in some measure the deficiencies left on that point by the accounts of preceding travellers, such as Burckhardt, Wellsted, Wallin, &c.: accounts accurate indeed, but incomplete. I shall then give a more detailed description of Nejed and the central provinces of Arabia; and lastly of the eastern provinces and 'Oman.

A vast extent of desert, with some scattered Bedouins roaming over it, a few rocky and barren mountains, black tents, sandy plains, and an occasional palm-tree or camel to complete the scene,—such is a very common idea of Arabia as deduced from the narratives of travellers, and even to a great extent confirmed, or rather embodied, in the outlines of many maps. Yet such an idea, as applied to the greater part of the Peninsula, is far from correct. Desert does, indeed, occupy a certain portion of it; but that is just the very portion with which the greater number of European travellers are almost exclusively acquainted—I mean the outskirts. There are, indeed, certain patches of desert, of whose nature and extent I shall say more hereafter, even in the very centre; and again the outlying circle of desolation itself does, in a southerly direction, assume extraordinary breadth and depth, thus encroaching over a large space towards the interior, but these are rather exceptions than the general rule. The real character of Arabia is that of a large table-land, naturally fertile, and which is either cultivated or at least susceptible of cultivation; whose valleys are well watered, and whose steppes are far from arid,—a land full of towns and villages, of life and habitation; and next, encircling all this, a ring of desert, sometimes very narrow, not indeed exceeding 50 or 60 miles in breadth, but sometimes of considerable width, especially to the north and to the south; and, lastly, surrounding all, a chain of mountains, varying in character and elevation, but generally low, stony and barren, bordered by a line of coast often arid; though here again the Yemen as well as the shores of 'Oman and Hasa, present exceptions of remarkable fertility.

Again, the desert itself may be distinguished into two kinds: namely, desert which is such merely because no one at the present day occupies or cultivates it, and which would be accordingly better styled "*deserted;*" and, secondly, *desert* in the full sense of the term—hopeless, irremediable sterility and desolation.

The former description of desert, or rather of deserted land, prevails towards the northern and western frontiers, the latter on the eastern and southern.

And, to speak first of the desert that borders the north and west. Here a substratum of rock, generally granite, is overlaid by gravelly or sandy soil, presenting in a greater or lesser degree those conditions which allow a possibility of life and vegetation, but never wholly destitute of them. This degree will of course vary in proportion to the quantity of water to be found at the surface, or at least at no great distance from it. It is, however, an unfortunate but a most characteristic feature of Arabia, that, through the whole of its vast extent, no single flowing river worthy of the name is to be found. I am aware that some compassionate geographers supply a few, but I regret to say that they have been in this respect more liberal than Nature. Nay, very few running streams even are to be met with, unless it be in the lowlands near the eastern coast and among the mountains of 'Oman, as we shall afterwards see.

The reason of this is evident. Mountains are the reservoirs of a country, and the nearer that country is to the Equatorial line, the loftier should be its mountains in order to afford a perennial supply of water. But Arabia, with the single exception of 'Oman, presents no mountains of sufficient elevation to answer that purpose. The range of hills near the coast is generally far too low—it varies, in fact, from about 500 to 1000 feet in height, but seldom surpasses it; and the centre is a mere steppe or plateau, whose table-lands barely attain 3000 feet above the sea-level, though they are decorated by the inhabitants with the title of mountains, for want of better.

Hence, whatever rain falls on these steppes, and rain does fall even heavily at times, especially in the winter and early spring, is soon absorbed in the crevasses of the loose soil, or in the sandy intersecting valleys, and thus collects underground, instead of above it. Near the sea-coast only, where the rim of the plateau breaks off abruptly, or gradually dips down, occasional running sources burst out, whose origin is to be sought for in the underground waters of the central lands. But as the coast itself is in general girt by a narrow mountain-chain close on the sea-shore, such rivulets very seldom reach the sea, much less form rivers worthy of finding a place in a geographer's map.

Of the abundance of subterranean water in central Arabia, and of the means of irrigation there employed, I shall say more in the progress of this narrative.

The same causes occasion a similar and an even greater dearth of above-ground water in the desert itself. Its regions are considerably elevated above the sea-coast, being as it were backed up on all sides by the surrounding range already mentioned; but they are again lower than the central steppes; their average altitude varies, as far as I could judge from rough and half guesswork mensuration, from 500 to 1000 feet above the sea,—perhaps a little more. Being thus neither high enough to attract the passing clouds, nor low enough to give outlet to the confined underground waters, and presenting a very chinky and fissured soil, they naturally remain drier than either the central plateau or the coasts themselves.

However, this desert or deserted land has its waters too, only they are in general to be sought for at a considerable distance underground: I have here seen wells of above a hundred feet in depth, though at times the water comes nearer the surface, especially, as we should naturally expect, in the lower grounds of such tracts. At times a long line of wells marks out the course of a subterraneous stream. Thus for the whole length of Wadi Sirhan, from the Hauran in Syria to the Djowf, water is everywhere to be got at by digging for 10 or 15 feet in depth, and occasionally even less. But in other localities, such as Wadi Farook, on the opposite side of the peninsula, wells have been sunk to 100 feet and more without thereby obtaining a single drop.

No one who has traversed these regions can have failed to remark throughout them the great frequency of abandoned and half-choked wells, or to notice that almost all the deeper wells, in the excavation of which much skill and persevering labour must have been exercised, are of comparatively ancient date. These facts throw light on the former populousness of the country, and confirm the persuasion that what is now desert was, at least very often, not invariably so, nor needs be now, at least as far as its physical qualities are concerned.

Besides this, even where no wells exist, the moisture of this subterraneous reservoir, except where very great depth or a rocky and entirely impervious stratum prevents, slowly oozes up through the soil, and gives rise to a tolerable growth of grass, herbs, and shrubs, nay, even trees. Of herbs, Wallin has already mentioned the "samh" in his description of the desert in the neighbourhood of the Djowf, and the full and accurate description supplied by him of that herb and its uses, may dispense me from repetition. Again, the mesaa', a shrubby bush, bearing small ovoid leaves, and a semi-acid fruit, much resembling our own red-currant in size, colour, and taste, abounds throughout the same region. These plants are peculiar to the north-western desert. Southward we find the khurta, whose leaves serve in tanning; the thorny katad; the sidr, with its small and dryish berries; the nabak, a low and tangled shrub, thickly laden in bearing-time with a fruit not unlike a diminutive apple, and which I have met with in Northern India also—it is more abundant towards the south-eastern desert; the graceful nabaa', and many other shrubs and plants, some possessed of narcotic or of medicinal properties, and bearing ample witness to the productive powers of the soil. In spring-time grass sprouts up everywhere between the pebbles, and its dry and yellow stalks may yet be seen waving in the autumn.

Such tracts form the greater part of the desert-ring to the north and west, and are to be found, though at rarer intervals, in the eastern part of the same circle, seldom in the southern. They are the customary resort of Bedouin tribes, whose indolence prevents them from profiting by the hidden resources of the soil, while its surface, without labour of culture, supplies the pastors and their droves with sufficient, though meagre, means of existence. Hence these wandering and brigandish herdsmen (for such is the real definition of the Bedouin Arab) swarm on the outskirts of the peninsula, and more especially on its northern and western frontiers. From this circumstance travellers, very few of whom cross the desert-belt towards the interior of the country, readily conclude that the land and its inhabitants are similar throughout to what they have themselves thus met with on the outskirts. And hence in a great measure have arisen exaggerated calculations of Bedouin force and number, and a somewhat depreciatory view of the whole peninsula itself.

But the Bedouins, like the tracts which they frequent, do, in fact, form little more than a sort of hollow circle surrounding a central region of a very different character both in itself and in its inhabitants. Accordingly, as we advance further on towards the inner provinces, cultivation soon re-appears, then increases, and at last becomes general, while the Bedouins, following an inverse gradation, rapidly diminish in number, and at last end by disappearing altogether, to the great advantage of these localities.

In some old-fashioned maps we find "Anthropophagi" put down on the extreme limits of discovered regions, as thus affording ample apology for want of ulterior exploration. Somewhat in the same way, Bedouin Arabs, being little disposed to let travellers, especially Europeans, pass unscathed, have become, and remained, the self-constituted limits of discovery, and all that lies beyond them is in consequence set down as Bedouin also. But to return to our subject.

I have already stated that this deserted rather than desert land lies mainly on the north and west of Arabia, that is in the space which separates Syria from the high Arab lands or Nejed, and again down the Hejaz along the course of the well-known pilgrim-road, almost as far as the neighbourhood of Mecca. Of these latter regions many travellers have given, if not an ample, at least a sufficient description; and of the northern belt between Syria and the Djowf, with the Wadi Sirhan, Wallin's relation supplies a correct and minute picture.

But when we approach the level of the Djowf we observe patches of white and glistering sand, at first of rare occurrence in the black and pebbly plain, but more frequent in proportion as we advance northwards, till at last below the Djowf they unite and form one continuous sandy region, while their whitish colour gives place to tints of yellow and orange-red. Here begin what, in the language of the country, are called the "Nefood," literally "the passes," because they must necessarily be traversed by those whose journey reaches further on towards the interior. Wallin, indeed, explains the term "Nefood" as synonymous with "lack," or "want of means of subsistence." The word might, it is true, bear such an explanation, but, in fact, it does not so here; the real signification, as it is thus used in the common language of the country, being the one I have given.

These "Nefood," or sand-passes, consist of long and broad streaks—rivers one might almost call them—of loose and deep sand, generally heaped up in enormous ridges or waves, whose invariable direction is from north to south: little or no vegetation presents itself on the unstable surface.

Wallin, who was unable to push his journey on to the centre and the south, gives many ingenious conjectures about the origin, course, number, and extent of these vast sand-tracks, along with an accurate and detailed account of such portions as he was acquainted with. But the circumstances of his journey obliging him to stop short of the real origin of the "Nefood," he could not sufficiently explain the phenomena about which he offers his interesting speculations.

But when we carry our investigations further southward, we become readily aware of the real character of this tract. The fact is, that these sandy rivers, the "Nefood," are nothing else than inlets, branches one might say, of the great southern sand-desert, which to the south-west, south, and east, holds the place of the stonier northern desert already described, and thus completes the investing circle of Arabia. This is the "Dahna," or "Fire-red," as the Arabs call it; that immense mass of sand chiefly situated below lat. 23° and 22°, to the south of the Hareek and of Wadi Dowasir, whence it extends down to the Hadramaut and the neighbourhood of Aden itself. This desert throws out on the east and on the west two long arms, which run in a northerly direction till they meet the descending curve of the upper or stony desert, to which they leave barely more than one-third of the circle to complete round the central district, thus isolated from the frontiers and the coast-line. From these two main arms push out again several lesser branches, which constitute the "Nefood" themselves, whose transverse lines penetrate far into the steppes of Middle Arabia, nay, in some places almost intersect them. But the subject merits a somewhat ampler detail, from the great light it throws on Arabian geography.

I have just said that the "Dahna," or Great Southern Desert, gives out two main arms, which, passing to the east and west of the central plateau, isolate it from the coast-line, and ultimately join the stony desert, or deserted land, to the north.

Now, of these two branches, or arms, the easterly one pushing up from the "Dahna" behind 'Oman (or 'Aaman in its Arab pronunciation, but I shall adhere to that customarily adopted by Europeans in order to avoid confusion), and thence passing close in the rear of Katar, the maritime province situated between 'Oman and Hasa, enters between the Hareek and the southern extremity of Hasa, and then proceeds nearly due north, leaving Hasa to the east, and the Hareek, the Yemamah, the 'Aared, and, lastly, Sedeyr to its west. Its average breadth is about 80 miles, though in some points, in that for instance where I myself crossed it, it does not exceed 40, and its general character is identical with that of the "Nefood" already described, only it is yet more unstable and barren. On reaching about 28° N. lat., behind the little territory of Koueyt, on the Persian Gulf, its sands give place to firmer soil, and it is thus ultimately merged in the waste lands behind Zobeyr and Basrah.

The other, or westerly branch, originates behind the Yemen and Wadi Nejran, and crosses the southerly extremity of Wadi Dowasir, of which more hereafter; it then proceeds northwards, leaving Kelaat Bisha to the west, and the main body of Wadi Dowasir to the east. It subsequently turns somewhat eastward by north, and passing in front of the provinces of Aflaj and Woshem, crosses Kaseem towards its western extremity. It is in general much less wild and desolate than the eastern branch, and before it finally merges in soil and gravel in the neighbourhood of Teymah it has lost much of the horrors, as well as the name, of the "Dahna."

This western arm of the desert gives off at certain intervals lateral branches, which form the "Nefood."

The northernmost branch of the "Nefood" is that crossed by Wallin, and by myself, between the Djowf and Djebel Shomer. It originates below Teymah, near Kheybar, and follows a line east by north, thus separating between Djebel Shomer and Teymah, the pilgrim-route, &c., till, arrived at about 28° 30′ N. lat., it turns eastwards, and runs in between the Djowf and Djebel Shomer, dividing them completely one from the other, until it ultimately loses itself in the stony tracts to the east of the Djowf, on the verge of the ordinary caravan-track from that province ot Meshid-Alee. Its average breadth is about 50 miles.

Secondly, when we descend southward towards Kaseem, we meet with a similar, but somewhat smaller, sand-stream, running out below Kheybar in an easterly direction, and thus passing between Djebel Salma on its north, and the province of Kaseem to the south. This second "Nefood" terminates in the plains of upper Kaseem without entirely traversing them.

Thirdly, and yet more to the south, occurs another inlet of the same kind as the two former; its course is towards the north-east, above, and parallel with, the low range of mountains which line the pilgrim-road leading from Mecca to Nejed. It passes below Kaseem, and divides it from the Woshem, after which it takes a northerly direction, and borders the province of Sedeyr, following the western skirt of Djebel Toweyk and the adjoining prolongation of Wadi Haneefah (localities of which I will speak more fully in the course of these notes), till it finally joins in with and merges in the rocky desert east of Djebel Shomer.

Such are, briefly, the outlines of the three principal "Nefood," or "passes," of Central Arabia. All originate, as we have seen, in the main western arm of the "Dahna," which they quit at a right angle, or nearly so. All pass between north and east towards the great inland plateau, which they almost, yet never totally, traverse; and all offer the same main features, though varying in length and width, as we have just shown.

The eastern branch of the "Dahna," hemmed closely in on either side by two high ranges, namely, "Toweyk" to the west, and the Hasa sea-range on the east, gives off few lateral inlets of any consequence. One such, however, originates from the broad mass of desert behind Hareek, and thence runs in a northerly direction between that province and the Yemamah, till it terminates in Wadi Soley', eastward of Riad. In this "Nefood" perished, about forty years ago, the Egyptian Basha Hoseyn, with a considerable portion of his army, sent in an evil hour against Turkee, father of Feysul, and chief of the Wahhabees. The treachery of Nejdean guides succeeded in entangling Hoseyn, with the main body of his troops, among these sand-hills, where the Egyptians perished to a man of fatigue and thirst, though the waters of Hootah were close by had they but known how to reach them. For many years after articles of dress and arms belonging to the wretched victims of this oft-repeated perfidy were sold at a low price in the markets of Nejed.

A scene of scarcely less horror occurred within the last ten years in the "Nefood" to the north of the Nejdean pilgrim-track. Here the victims were a troop of Persian pilgrims, on their overland way to Mecca. They had halted at the town of Bereydah, in Kaseem, where the Nejdean chief Mohanna then governed, as he still does, in the name of Feysul. The cupidity of Mohanna was excited by the riches and the copious baggage of his Persian guests, and after detaining them a considerable time at Bereydah under various pretexts, he at last persuaded them to leave behind them, in his own safeguard, the greater portion of their heavy baggage, for fear, said he, lest enemies should meet and plunder them on the way between Kaseem and Mecca, whither they were bound. He next gave them for guide his own eldest son, a youth worthy in every respect of such a father. (I may remark, in a passing way, that I have been honoured by the personal acquaintance of both.) This traitor led them astray off the beaten track into the waterless labyrinths of the "Nefood," and there absconded and left them to die of thirst and heat. Almost all perished; a few only, more fortunate, found their way out of the sandy maze, and reappeared, worn out with privation and suffering, at Bereydah. There Mohanna met them with an absolute denial of baggage or anything else belonging either to them or to their luckless companions, and the doubly-betrayed survivors had to beg their long way back to Meshid-Alee and Persia as best they might.

These incidents may give an idea of the nature and perils of the Arabian "Nefood." The prodigious depth of their sandy stratum, often not less than many hundred feet, so far as I could ascertain by comparative observations, renders water, of course, out of the question for the most part; and this, along with the extreme heat of such tracts, the want of pasture, the total absence of anything like shade or shelter, and the labour of wading now up, now down, through the mountain-waves of loose and scorching sand, render their passage no easy and even no very safe matter, especially in the hot summer months.

These dreary characteristics are not, however, without occasional and favourable exceptions. Now and then, in the very midst of the sandy ocean, its waves recede on either side, and leave a sort of conical hollow of great depth (I have seen some of fully 400, or even 500 feet, in perpendicular depression), at the base of which appears a substratum, sometimes of granite, sometimes of calcareous rock, between the clefts of which, or in the wells excavated by Arab labour, water is generally to be found. Such spots, being the only places of rest and supply, determine the direction of the traveller's course in these regions; but few—only those, in fact, whom long experience has rendered familiar with their position—know where to look for them; the more so because nothing indicates their proximity, even at a very moderate distance: and hence arises the absolute necessity of experienced and faithful guides for traversing the "Nefood."

At other times a bold peak of black rock pierces through the sand, and breaks the weary monotony of the view. Such are the two isolated rocks rising in the "Nefood" about half-way between the Djowf and Djebel Shomer, and named 'Aalam Es-Sa'ad. We passed between them when on our way southward from the Djowf, and were much struck by their symmetrical and pyramidal form. In my further course I met with a similar peak in the "Nefood" adjoining the province of Woshem.

The symmetrical undulations of the sand have found in their parallelism with the axis of the earth a tolerably plausible explanation, derived from the inequality of the rotatory movement of the globe when communicated through the hard rocky base to the loose and sliding mass of sand above. As these regions are comparatively near the Equator, the rapidity of diurnal rotation is greater, and the phenomena consequent on it are, of course, more prominent here than in corresponding localities further north. The gigantic and regular furrows of the "Nefood" are very distinct from the capricious ridges seen elsewhere, and arising from the action of the winds, which wrinkle the surface of the sand in every direction, till the whole desert presents the likeness of a fiery ocean after some months of a steady monsoon, suddenly ruffled by a brisk gale.

Such is the lightness of the sand, especially southward, that a camel's track is often effaced almost as soon as imprinted, though the poor animals have been sinking up almost to the knees in their laborious way. Sand-storms, much resembling the dust-storms of Northern India, are not uncommon here; but, as for the stories of moving columns of sand, and whole caravans thus suddenly whelmed in an arenaceous grave, all the Bedouins whom I met laughed at them downright, and declared them to be mere travellers' tales. Certainly in a pretty long experience of the desert, exactly in the hottest summer months and over so much of its extent, I saw nothing of the kind.

Mirage, with all its capricious freaks, is never wanting. Once, and once only, we fell right in with the deadly simoum, and had more than enough leisure for observing its strange phenomena. But I must reserve their description for another occasion.

Of the Bedouin tribes which frequent these deserts, and their accompanying "Nefood," I may be here excused from giving a detailed account; the subject is very long, and not entirely new. Their catalogue is, briefly, as follows:—The Scherarat (very savage beings), the Howeytat, Benoo Atiyeh, and the marauding Bisher, to the north; besides occasional visitors of the Syro-Arabic tribes, such as the Roo'alah, Teiyyahah, Sakr, Woold-Alee, &c. &c. Further east by south we meet with the numerous clan of Shomer, the Montefik, the Mesaleekh, and the dreaded Benoo-Lam; down the west, southwards, the Ma'az, Harb, an ancient and a very troublesome tribe, and Kahtan; while in the more central regions I found the Sebaa' (different from those of the same denomination in Syria), Meteyr (a wealthy tribe), 'Oteybah, and the inhospitable Dowasir, or Aal-Amār; lastly, in the east itself, the 'Ajman, Benoo Khalid, a wide-spread clan, and Benoo Hajar. These tribes are of varying number and strength, but their total aggregate does not exceed 400,000 souls; such, at least, is the conclusion which we arrived at on summing them up in cyphers, after counting them separately, tribe by tribe. There exist among them interminable subdivisions and varieties of name and kindred; but all, or almost all, belong to the main clans here mentioned. Enough of this for the present; in Central Arabia a more interesting and a newer field awaits us.

However, before I finally quit the desert for the steppes and villages of the inhabited land, it will be well to add a few words about the great Southern Arabian desert, the "Dahna" itself. It reaches from Katar and 'Oman on the east, to the Yemen and

Wadi Nejran on the west; the provinces of Hasa, of Hareek, of Aflaj, and the Wadi Dowasir, bound it to the north, and Hadramaut to the south; such are the limits of this broad base of the desert ring.

Its general type—at least so far as my own experience enables me to speak—is an exaggeration of the "Nefood" already described, and enormous tracts of its waste sands are in consequence never visited or traversed even by the most vagabond Bedouins. However, there exist in it occasional "oases," little islets of a more tractable character, amid the depths of this desolate sand-sea, especially where the under stratum of limestone finds its way to the surface; while water rises through its clefts, and dwarf palms, or bushes of the dishevelled Ghada, familiar to Arab poetry, spring up around. Many such spots are said to occur on a line drawn south-east by east from 'Oman towards the Yemen, they become more frequent on approaching the limits of Hadramaut. Here, also, so I was told (for my own personal acquaintance with the Dahna is limited to its northern and eastern spaces), rocky peaks interrupt the sand from time to time; while a low calcareous range is stated by the Arabs to lie north-west of 'Oman; it bears the name of "Akhāf."

For some of these details respecting the "Dahna" I am indebted to two intelligent Bedouins, the one belonging to the tribe named Menaseer, the other to Aal-Morrah, who had both of them traversed the Dahna in its greatest width, rather in consequence of chance circumstances than from any fixed purpose of doing so. They described the oases mentioned above as being inhabited by a few scattered negro and Abyssinian tribes; but far the greater extent of that region was, according to them, alike uninhabited and uninhabitable. The Menaseer Bedouin told me that he had taken nearly three months to cross the desert or khala' from the frontiers of 'Oman to those of Yemen; but his line of journey was probably somewhat tortuous; and hence this circumstance affords no very exact idea regarding the real and geographical width of the "Dahna."

The two tribes here alluded to—namely, the Menaseer and Aal-Morrah—frequent the eastern and northern frontiers of this region; while its westerly limits are the resort of Kahtan and other tribes of the Yemen. As for the inhabitants of the southern verge, they are mainly blacks; of negro, or, at least, of African origin.

But these tribes are of comparatively scanty number, and very miserable in condition, as might be well expected from the nature of the country they inhabit. The Menaseer alone, because the nearest to 'Oman, partake in some degree of the advantages of that fertile province. But the Aal-Morrah Bedouins are of a remarkably savage type, and their language, though not differing enough from the ordinary Arabic of the peninsula to merit the title of a distinct dialect, yet offers several peculiarities which puzzle the inhabitants of 'Oman and Nejed when they come in contact with these barbarians. These Bedouins are smaller in stature, and duskier in hue, than those of the north; some are even, as I have said before, entirely black, but that, again, is owing to a difference of race.

Enough of the desert. Let us now turn to a portion of Arabia less accurately known, I mean the Central Districts. I will first describe briefly their general conformation and features, and afterwards proceed to such details as the subject may require, or space permit.

The great table-land of Arabia, called by most writers, whether Arab or European, Nejed, does not, as some have asserted, commence with the Djowf, which is a hollow; whereas the Arab word "Nejed" denotes, on the contrary, "high-lands." The Djowf is a long valley in the midst of the Stony Desert, situated at the southern extremity of Wadi Sirhan, and at an equal distance south-east and south-west from Damascus and Bagdad. Between it and Djebel Shomer lie the Nefood just described. Its average depth below the surrounding level is from 200 to 300 feet. It contains, besides the town of Djowf, itself a coalition of eight townlets into one, the large village of Sekakah, those of Djoon, Dorrah, and seven others. The total population is estimated at about twenty-eight thousand souls. This valley abounds in springs of water; it is fertile, and thickly planted with palm-groves and gardens. We remained here about twenty days, and then crossed the Nefood to Djebel Shomer. Here begin the first northerly limits of Nejed proper, assigned by the rise of the Shomer Mountains, whose long and craggy granite chain crosses more than half the peninsula in a direction of north-east by east, beginning in the neighbourhood of the upper Hejaz, and merging ultimately in the desert towards Coufa, now Meshid Alee. These mountains, or, to give them an exacter name, rocks, for they are hardly more, rise abruptly in steep and fantastic barrenness from the plain, and form the first bulwark of Nejed. Their greatest altitude does not exceed 1200 feet above the plain. Many of their topographical peculiarities, and even some of the towns and villages scattered amongst them, have been described by Wallin, but much would remain to say, did our limits here permit. The title of Shomer is applied in a political sense to that entire region of Northern Arabia which includes the Djowf, Teymah, Kheybar, Djebel Shomer, Salma, and Upper Kaseem. All this, with the adjoining desert from Meshid-'Alee on the east to the great Hajj or Pilgrim-route on the west, is subject to Telal Ebn-Rashid, who resides in his capital Hā'yel.

This town, whose greatness is of recent date, comprises above twenty thousand inhabitants; the palace, mosque, and market-place have all been built within the last twenty-five years. It is a thriving city, and carries on an active commerce with Meshid-'Alee and Medinah. It is the principal horse and camel mart of Arabia for the north. The country around is rocky, but not unfertile. The villages of Djebel Shomer itself are estimated at about forty; the principal ones are those of Kenah, Lakeetah. Mogah, Kefar, and Adwah. The total population subject to Telal Ebn-Rashid amount to above half-a-million: about one-third of these are Bedouin. The inhabitants of Djebel Shomer pass for the finest race of men, and their language for the purest spoken in Arabia.

I remained in Hā'yel and its neighbourhood about a month and a half, and then continued my journey southwards. After passing the last ranges of Djebel Shomer or Aja, and traversing a wide valley near 20 miles in breadth, we reached Djebel Salma, a long granite chain parallel in its direction to Djebel Shomer, but of less extent and height, among whose wild peaks lies buried Hatim-et-Tai, a native of this district, the oft-cited model or exaggeration of Arab hospitality and generosity. To Djebel Salma, or "the Mountain of Salma," succeeds a large table-land, full 80 miles in width; its greatest length is from west to north-east. This is the upper division of Kaseem. It is in general a tolerably fertile plain; and where its numerous valleys, all of which lie parallel to each other from west to east, are irrigated and cultivated, in the neighbourhood of the many villages which bestud them, the produce of the soil is sufficient for the support of a considerable population.

In fact, green gardens, watered from perennial wells, where melons, cucumbers, maize, leguminous plants, peaches, apricots, and other fruits abound; large plantations of date-trees clustering with copious produce; ithel-trees, for timber (the ithel is a species of larch-like tamarisk, very common in Arabia, and which is not unfrequent in Nubia also; its foliage, like that of the rest of the family, is not perennial; its fruit, a small cone, much like that of the cypress; its wood light and tough, and smelling of turpentine), and other varied vegetation, attest a fertile, or at least a not unproductive land. The total number of villages here is between 20 and 30; some, for instance, Kefa, contain about 2500 inhabitants.

This district was lately acquired from the Wahhabite government by Telal Ebn-Rashid, Prince of Djebel Schomer.

Between the valleys are strips of higher land, covered with aromatic herbs and varied pasture. The morning breeze, freshened by the elevation of the region, rustles through long grass and tangled shrubs; and the traveller, if versed in Arab poetry, readily understands and appreciates the lavish praises bestowed on Nejed, with its cool air and abundant pastures, by poets, natives themselves of the barren Hejaz or the scorching Tehama. It was in the month of September that I traversed this district, and a more pleasant ride could hardly be imagined. In these regions the vigorous government of Telal Ebn-Raschid keeps Bedouins and all similar marauders in due subjection, and the traveller has here the satisfaction, so rare in the East, of going on his way without fear of being plundered or assassinated by day or night. I wish that one could say as much for the countries under Ottoman rule.

We crossed this plain in a direction of south-east by east for about 80 miles. I say "about" 80, for I had no means of measuring the distance thus traversed except by reckoning the average extent of ground gone over per hour at an ordinary camel's pace, which varies from 4 to 5 miles, more or less. The same observation applies, of course, to all other distances mentioned in this narrative.

But after 80 miles, or a little more, south of Djebel Salma, the whole level changes, and takes a sudden dip of about 300 feet; while an immense plain, that of Kaseem proper, opens at once on the view. Villages and gardens, towers and palm-groves, thickly strewn over an even surface as far as the utmost horizon; it is a noble and a very pleasant prospect. This new district, or lower Kaseem, takes its first origin eastward of the great pilgrim-road in the Hejaz immediately behind the desert arm already mentioned; and thence extends in an easterly direction across the central region, till at length the high lands of Djebel Toweyk, and the province of Sedeyr, assign its farthest limits. Southward lies a branch of desert —the "Nefood" where perished the unlucky Persians, guests of Mohanna—and a low series of mountains given off from Djebel Toweyk itself in a westerly line, so as to pass northward of the pilgrim-track from central Nejed to Mecca, bound the valley.

I may here remark, once for all, that Central Arabia affords four distinct outlets or beaten tracks towards the western coast, all of which traverse the desert ring, but at its thinner points. The first of these is the route from Hā'yel and Djebel Shomer to Medinah, and thence to Mecca; it opens into the Hejaz at Kheybar. The second, from 'Oneyzah and Kaseem, direct to Medinah; its junction point with the western region is Henakeeyah. The third, from Er-Riad, Derey'eeyah, and Shakrah, in Central Nejed, direct to Mecca, whose territory it enters at the station of Meghasil: this is the pilgrim-track. The fourth, and southernmost, is from the Yemamah and Aflaj, by Wadi Dowasir, to

Wadi Nejran and the Yemen; its opening point is at Kela'at Bisha, whence also goes off a north-westerly track to Mecca.

The northernmost route, followed by Wallin and myself, from Ma'ān to the Djouf, is too unfrequented to merit the name of a road or caravan-track. There exists, besides, a line of communication direct from Damascus to the Djowf, but it is rarely used by travellers.

Eastward we find lines of communication between the centre and the borders. The first, and most circuitous, is from the Djowf to Meshid-Alee; but, as I have before stated, the Djowf scarcely belongs to Central Arabia. The second, from Hā'yel and Djebel Shomer to Zobeyr and Basrah, or, by a northerly branch-road, to Meshid-Alee. This is tolerably frequented. The third, from Kaseem to Zobeer, passing by Zulphah, where also a southerly route, traversing central Nejed to Riad, falls in with it. The fourth, and last (of which I shall have to say more in this journey), passes due east from Er-Riad and the heart of Nejed, to the town of Hofhouf, in Hasa, and thence to Kateef. Its exit from Nejed is at the waters of Oweysit.

Of these four tracks three are circuitous, and by their northerly direction avoid the sandy "Nefood," but they are long and dreary. The fourth crosses the "Dahna," and is the only junction-route, though after a long circuit through Katar, between Nejed and the regions of Oman, otherwise entirely cut off from communication with Central Arabia by the intervening "Dahna." But it is time for our narrative to return to Kaseem.

It is the most fertile and most thickly-peopled province of Central Arabia, and, as such, is often mentioned in Ante-Islamitic history. Hence poured forth in early times the countless bands of Nejdean warriors, Bikr, Thaghleb, Sheyban, Dahel, and other kindred clans, who, under their common leader, Koleyb Waïl, shook off the yoke of the Yemanite kings about 120 years before the Mahometan era, and gave independence to Central Arabia, till in their turn subdued by the warriors of the Hejaz, the companions and disciples of the Prophet.

In fact, the appearance of the principal towns in this district, such as Bereydah, 'Eyoon, Rass, Oneyzah, Sariyah, and others. their strong and bastioned fortifications, their spacious castles, their wide-extended gardens and plantations, the high watch-towers overlooking the plain, and the vestiges of yet more ancient stone-works, much resembling in form, and even in dimensions, Stonehenge or Carnac, and of which I myself met one near Rass, confirm what written history and oral tradition tell us of numerous population and considerable opulence, of vigorous dynasties and central power here subsisting, till Mahometanism appeared to usher in the decline and general decay of the Arabian peninsula.

What between towns and villages, Kaseem offers about 60 principal localities, besides lesser hamlets or groups of huts clustering round gardens and palm-groves scattered here and there over the plain.

Its natural resources are mainly due to the great abundance of water, though here as elsewhere subterraneous, in this province. Throughout the valley of Kaseem, a well of 3, 4, or at most of 10 feet deep, and easily excavated in the light soil (for there is little rock in these low-lands) affords an abundant supply of excellent water, little diminished even during the prolonged drought of the summer season. In winter the wells overflow their brim and often form pools of considerable extent, little lakes in fact: I saw the traces of many such during this part of my journey.

There is here a remarkable rise in the mean temperature of the atmosphere, and the difference of climate between the low southerly flats of Kaseem, and the brisk high ground of Shomer and Salma, is even more than one might have anticipated. This, along with a more copious supply of moisture, gives rise to a much more abundant and to even a somewhat different kind of vegetation. Dates are here cheap and very good, yielding in flavour to none except those of Hasa. The different fruit-trees before mentioned abound here, and corn, millet, maize, lentils, and other vegetables, are extensively cultivated. But in addition to these esculent products, cotton of a very tolerable quality, much resembling that grown in Indian Guzerat, here makes its appearance, and its copiousness asserts a warmer climate than northern Arabia can boast.

The inhabitants are a fine and tall race of men, their braided locks falling on either side of a handsome and open countenance, give them a somewhat rakish appearance. Their complexion is a light olive, but grey eyes are yet, though seldom, to be met with; their hair is invariably black. As their dress resembles that of the other Nejdean provinces, I reserve its description for a little further on.

Of their religious and political condition, the narrow limits of this very cursory narrative forbid my speaking at present, and I accordingly leave that subject—a very interesting one—for an ampler account of this journey.

As Kaseem is mainly low land, comparatively speaking, its inhabitants often draw a distinction between it and the Upper Nejed or "high-lands," which I must next describe.

After about a month passed at Bereydah and in Kaseem, we turned eastward, crossed the Nefood which divides that province from Sedeyr, passed the large and commercial village of Zulphah, and found ourselves in face of the great uplands of Arabia, the heights of Djebel Toweyk.

Every one who casts a glance over the map of Arabia, must have remarked the name of Djebel Toweyk (sometimes, though improperly, designated by Djebel-Aared), placed now here now there alongside of certain mountain-chains of a somewhat arbitrary appearance, and delineated as not far from the centre of the peninsula. This same Djebel Toweyk is in fact a vast calcareous plateau, and the so-called mountain-chains are, for the most part, mere indications of its limiting margin; higher indeed than the neighbouring plains, and thus offering a mountainous appearance, but not succeeded by valleys or mountains on the other side; it *borders only* a pretty uniform steppe, whose utmost verge is at no great distance from the eastern coast, or which gradually merges in the southern desert.

The general form of this plateau is a broad crescent. Its north-easterly limb constitutes the province of Sedeyr; its centre forms the Aared and Yemamah, while the Aflaj, Woshem, and a long and elevated offshoot extending to the south-west complete the other limb. The provinces of Hareek and Wadi Dowasir are off-lying appendages on its convex margin, while Kaseem lies in its concave hollow. The space occupied by the cresent itself, or Djebel Toweyk, is Nejed el-'Aala, or Upper Nejed; its appendages, with Kaseem, are sometimes decorated with the common title of Nejed, but in a political or ethnographical rather than in a geodicean sense. A yet wider application of the name includes Djebel Shomer, and even, though only in the mouth of strangers, the Djowf.

The general elevation of Toweyk above the surrounding plains, is about 1500 to 1800 feet, but may occasionally exceed 2000. Its highest point is Djebel 'Atālah, or the "Barren Mountain," near the juncture of the provinces of Sedeyr and Aared, near Wadi Haneefah, about lat. 25° N. Of these localities I will give a more particular description further on.

This plateau is intersected by many tortuous valleys, penetrating it now and then to a great distance. Of these the most remarkable, and which merits a more special notice, is Wadi Haneefah.

This valley in its westerly origin coincides with the Nejdean pilgrim-route, which follows it for about a fourth of its length as far as the southern limit of Woshem, and even within the limits of that province as far as the town of Shakrah. Here it divides, so as to assume the form of the letter Y; and one branch runs northerly between an arm of desert (the "Nefood" already mentioned further back) and the heights of Sedeyr, till it finally opens out on the north-eastern space below, and somewhat to the east of Djebel Shomer.

The other branch, on leaving Schakrah, penetrates immediately into the mass of Djebel Toweyk itself, and passes through the centre of the province Aared, where it assumes its topographical name of Wadi Haneefah, as far as Derey'eeyah, now a heap of ruins.

At the distance of about a league before it reaches Derey'-eeyah, another and a smaller side-branch quits the main valley, and leads straight to the actual capital Er-Riad. Here it re-unites with the principal channel of Wadi Haneefah, and then pursues an easterly direction, till 10 or 12 miles further on it joins Wadi Soley', with which it is henceforth confounded.

Another and very large ramification is given off at Malka, not far to the west of Derey'eeyah; it bears the common name of Wadi Haneefah, and conducts to the wide-scattered ruins of 'Eyanah; then runs east by north till it rejoins Wadi Soley' higher up, namely behind the further steppes of Djebel Toweyk in the province of Sedeyr.

Lastly, this same valley, at the town of Riad, sends out a south-westerly branch towards Aflaj, and thus ultimately affords an imperfect communication with Wadi Dowasir, and the southern regions.

Such are the ramifications and course of Wadi Haneefah, or "the Valley of Orthodoxy"), formerly known by the name of Wadi Moseylemah or "Valley of Moseylemah" from the famous Nej-dean pseudo-prophet, cotemporary and rival of Mahomet; and of whom many even now say in Nejed, that "he and Ma-homet were equally prophets, only the latter had the better luck." Of his influence in Central Arabia, of his Coran, and of the traces he has left, in spite of Mahometanism and Wahhabeeism, up to the present day, I can, for the reasons already assigned, say nothing here. I return to the Central Plateau.

Whether rising in steppes or furrowed by valleys, the general altitude of this entire region is considerably above that of the rest of the peninsula in whatever direction ('Oman alone excepted); and this is implied by the common Arab phrase of "Talaat-Nejed" "going up to Nejed," as well as by the inverse expression "Anhader Hejaz," &c., "going down to the Hejaz to Hasa," &c.

Wallin, if I remember right, seems to believe the contrary, and brings forward in favour of his theory the popular term "Nezel Nejed," which he renders by "going down to Nejed," and which would thus imply the altitude of Nejed to be inferior to that of Djebel Shomer, or other points of north-western Arabia where that traveller took his observations.

But this is a misunderstanding, occasioned by want of intimacy with the Arab language. "Nezel" does indeed mean "descend," but when applied to a journey, it does not relate to the height or depression of the localities, but to the act of "descending" (we should say "alighting") from one's camel or horse on arriving at the place in question. One may thus say "nezel" or "descended," when describing one's visit to a town, *e. g.*, at the very top of a mountain. In a word its force is circumstantial, not topographical, at least in Arabia. The true word for "descending" in the latter sense, of which it is here in question, is "anhader," or "hader," and that is never applied to "Nejed," about which on the other hand they constantly say "talaa," literally "he went up," in a true and topographical sense. These terms may indeed be occasionally confounded in Syria or Egypt, where Wallin had, I suppose, learnt the language, but are never so in Arabia Proper.

I have said that the high land, or Toweyk itself, is generally of a calcareous character, though at times intermixed with granite; ferruginous sandstone and quartz also are occasionally to be met with—I found many indications of iron-ore in great quantity on its easterly limits, near Wadi Soley'; and, if I am not mistaken, of copper-ore also. The higher surface of the plateau is somewhat arid, and its vegetation, though enough to afford a sufficient pasture for the countless herds of camels and sheep-droves that graze throughout its extent, is not abundant or varied.

The few trees here met with are generally either the wide-spreading and thorny Talh, the branching Markh, and the light foliage and yellow flowers of the graceful Sidr. This is on the high grounds of the plateau, for the valleys present a very different vegetation. Sometimes a second steppe, more arid than the first, overtops it by 500 or 600 feet. The air is cool, almost bracing, and very dry.

Such are the heights of Nejed, mere pasture-land, and less fertile than healthy. But in every direction they are traversed by a network of valleys, full of life and culture. Sometimes in their abrupt and trench-like form they resemble the "nullas" of the Deccan; frequently open and broad, they attain a width of a league and more from bank to bank. Their white and precipitous sides give the appearance of being artificially cut out in the thickness of the plateau, though they are often broken by the furrows of winter-torrents pouring down over their ledges, and piling up irregular masses of rock and limestone in the valley below. It is to the sinuous lines of these hollow passes that the excavated steppe owes its labyrinthine appearance, and hence perhaps its appellation of Djebel Toweyk, *i. e.* "the mountain of the little convolution" or "entanglement."

We may here notice that the diminutive nominal form, as "Toweyk" for "Towk," "Loheym" for "Lahm," "Roweys" for "Rás," &c., &c., is very frequently, indeed almost affectedly, employed in Nejed; and rather implies a certain familiarity, affection, and the like, than real smallness of dimension. Such is the case with Toweyk in particular.

The ground-soil of these valleys is generally of light earth, intermixed with sand, gravel, limestone, granite pebbles, quartz, &c., washed down from the adjoining heights by the rains of winter. Indeed at that season the hollows are often transformed into mere torrent-beds; and the earth-built houses erected in their cavities are frequently ruined and washed away. Of this I have seen numerous instances at Zulphah, Rowdah, and at Er-Riad itself. But these torrents are of very brief duration; in three or four days the water subsides, then the pools it has left behind soon dry up, and the moisture remains for the rest of the year hidden at a few feet below the ground level. Water under such conditions, abounds in almost all the valleys of Nejed, and hence the frequency of populous centres and cultivation throughout its provinces. But the gardens and villages, the fields and groves, are invariably situated in the depth of the valleys, and thus remain hidden from the view of the traveller until he comes close upon them. Sedeyr, an extensive highland province, contains above thirty towns or villages, some of them like Djelajil and Horeymelah, are of very ancient date. Woshem is even more populous; its centre is the commercial town of Shakrah. The 'Aared, a small but important province, and the very heart, so to speak, of Nejed, contains only fifteen; but among these are Er-Riad, the capital, Derey'eeyah, Manfoohah, and others of considerable importance. Aflaj possesses an equal number, but of less numerical and political value. The most fertile, as well as the most thickly peopled district here, is Yemamah, frequently named also the "Kharj," or "income," from the large amount of its annual tribute to the central government. Its valleys are remarkably broad and numerous, and its waters abundant; hence its principal towns, such as Selemeeyah, Halwa, &c., are distinguished not only by the number of their inhabitants, but also by the great extent of their adjoining palm-groves, visible afar off like green carpets thrown here and there on a yellow or whitish ground.

Nejdean towns in general,—for my actual limits do not permit their separate description one by one,—offer an assemblage of one or two-storied houses, constructed of large unbaked bricks, almost rivalling stone in hardness and durability. They are in all cases surrounded by earth fortifications, consisting of walls about 20 feet in height, with somewhat loftier towers and bastions, and three or four outer gates, well flanked by towers, and not unfrequently closed by large folding doors of timber, for instance at Mejmaa, the head-town of Sedeyr, Riad in the Aared, &c.,

a deep trench surrounds part or the whole of the outworks. Often too, indeed in all places of any importance, there exists within the walls a central castle or fortress, whose walls rise from 40 to 60 feet in height, or somewhat more, and are of an enormous thickness, not unfrequently augmented by a glacis. The portal is generally small and narrow and placed on one side, deep sunk between protecting bastions; the windows are also small; a trench is sometimes added from without. Here resides the chief or local governor; earth-seats in the open space before the walls denote the situation no less than the primitive character of his highness's customary audiences or leveés.

The streets present, as is generally the case in the East, but little arrangement or symmetry; they are sometimes broad, oftener narrow, never regular. But in every town or even village is to be found the central market-place, always close by the castle, and, in Nejed at least, on one side a large low mosque for the Wahhabee form of worship. This latter edifice is of never-failing occurrence since the establishment of the fanatical Ebn-Saood dynasty. Shops, or rather warehouses, are common enough in these towns; they form the greater part of the market-place and occupy its neighbourhood; a small number of artisans, chiefly in metal or in leather, here ply their trades. Among shopkeepers, butchers, cloth-sellers, and grocers, thrive better than any, and are more often to be met with.

Without the walls, rarely within, lie the gardens, the constant accompaniment of a Nejdean town, and a main source of sustenance to its inhabitants. They are thickly planted with palm-trees; and other fruit-trees are seldom or never wanting. Beyond the gardens are situated whatever fields of corn or of leguminous plants the irrigation from the neighbouring wells may suffice to maintain; for without a constant and artificial supply of water, no agricultural produce is to be obtained in Central Arabia. Date-trees are also watered almost daily, other fruit-trees less, the ithel not at all.

The wells are numerous and of moderate depth; indeed I do not remember having seen any in Nejed where water was not to be had at about 12 or 15 feet only below the surface; even less depth is required on the southern limits of Aared and in Yemamah. This presents a striking contrast to Djebel Shomer, where water often lies at 60 feet underground, and more. The better supply of moisture, in these regions is owing partly to their comparative proximity to the Persian Gulf, and its abundant rains, and partly to the greater elevation of the neighbouring Toweyk plateau and its steppes, much higher than the ragged peaks of the rocks of Shomer.

The wells are worked by buckets (leathern, of course) attached to ropes which pass over pullies placed in a sort of gallows above the well, and drawn by camels, or asses, rarely by oxen. Indeed in Djebel Shomer, Kaseem, Sedeyr, and Woshem, this latter species of animal is entirely, or almost entirely unknown; but it reappears in Aared and Yemamah, and increases in frequency in proportion as we approach the Hasa and 'Oman. These kine are generally red in colour, small of stature, and have on their back, over the shoulders, a characteristic hump, much like their Eastern brethren, the Brahminee bulls.

I say nothing here of the camel-breed; its copiousness may be imagined in this land of camels. They are in fact to Nejed, for all sorts of work and luxury too, much what horses and kine taken together are for England, at least before the multiplication of railroads had lightened their employments.

The horses of Nejed also hardly belong to my present subject; and I must accordingly reserve a fuller history of them for subsequent publication, yet I cannot here dismiss these beautiful creatures without a few words. They are incomparably the best, the standard breed of Arabia, indeed of the whole world. Light in limb, small in stature, their average height being about 14 hands, seldom more, full in the back, haunches, and chest, their tail set off at a graceful arch, the dorsal bone slightly depressed, so as to give the animal a somewhat saddle-backed appearance, though that is also due in part to the remarkable fulness of their hind-quarters, their muzzle delicately taper, their ear small and pointed, their eye large and full of life, their shoulder at a lovely slope, unlike the heavy Persian or Cape breed, their legs all bone and sinew, and slender as bars of iron, the hoof small and neat; in a word, they present the most perfect model, the "beau-ideal" of equine perfection.

They are never used for hard labour of any sort, not even for travelling, at least to any distance. War and parade are all their business. Nor are they ever sold; they change masters only by heritage, gift, or capture; and no price is in consequence assigned for them. Hence it follows that they very seldom leave their native Nejed. Such horses have indeed been occasionally sent as presents to the Sultan, to the Shah of Persia, to the Egyptian Government, and more often to the neighbouring and international Arab states. But the animals thus parted with are of course stallions, and not the best of them either; as for the mares they are not to be had even thus. However the Arabs of Shomer and the other neighbouring clans, whether Bedouins or others, not unfrequently manage to get their mares crossed from this breed, and then sell the foals under the name of Nejdee horses at Meshid Alee, Bagdad, or Syria. Hence arise many so-called Nejdee horses, occasionally met with even in European stables; good beasts, but not of the pure race.

Nor must I at present give, though I should much desire, a detailed account of the past history or present condition of the Wahhabee government, often called "Nejdean" by the Arabs, in allusion to the provinces of its centre and birth-place. Enough to say that Feysul, Ebn-Turkee, Ebn-Abd-Allah, Ebn-Saood, the seventh in regular succession of these rulers, now extends his dominion over the whole of the lower Kaseem, the districts of Soleyyel, Wadi Dowasir, Aflaj, Woshem, Aared, Sedeyr, Yemamah, Hareek, Hasa, and Kateef; the islands of Bahreyn also, though not strictly speaking subject, yet pay him an annual tribute. His empire, accordingly, as a glance at the map will show, stretches in a broad belt across the centre of Arabia from the very limits of the Meccan territory, Kelaat-Bisha, and Wadi Nejran, up to the shores of the Persian Gulf. Its limits are assigned northward by the independent kingdom of Telal Ebn-Rashid and the territory of Koweyt, on the south-east by the kingdom of 'Oman, due east the Persian Gulf, south the desert; and to the west Djebel Aseer, the Meccan limits, and the pilgrim-route as far back as Medinah. It is the strongest and most closely organised, though not the richest or most populous (for 'Oman surpasses it in either of these respects) kingdom in Arabia at the present day; and though it has never fully recovered from the blow inflicted by Ibrahim Basha and the Egyptian occupation, it is yet very formidable to its Arab neighbours, and even an object of much suspicion and uneasiness to the Osmalee at Mecca.

South-west of Djebel Toweyk, beginning at the province of Aflaj, and terminating near Kelaat-Bischa, runs a long and broad valley, known by the name of Wadi Dowasir. Its inhabitants are numerous, but poor, half savage; and an inhospitality unusual in Arabia renders them of singularly ill repute. They are the most bigoted among the bigoted Wahhabites. Their villages are small, and dotted at short intervals down the sandy valley, their houses for the most part mere palm-leaf huts, thus affording an indication of the increased heat of the climate, corroborated by the dusky complexion of the people themselves. This valley opens out at its south-western extremity into Wadi Nejran, and thus affords a sort of high road, the only one indeed, from Nejed to the interior of the Yemen, passing behind Djebel Aseer and the sea-coast range. Such was the information given me by many trustworthy informants of those regions. I myself did not visit it in person, though I was near its upper end in the Aflaj; indeed as the murder of a tobacco-smoker (or "drinker of the shameful," in their cant-phrase) is throughout the Wadi Dowasir looked on as a highly meritorious action, I should have been in a somewhat dangerous predicament; in the other Wahhabee provinces a little more toleration can be had, at least in the case of a stranger like myself, for the persecuted Nicotian plant.

The inhabitants of Nejed in general, but more especially those of the upper highland provinces, or Nejed-el-'Aala, are a remarkably fine and intelligent race of men, of a tolerably fair complexion, though with dark eyes and hair, sinewy limbs, full stature (the average from 5 feet 8 inches to 5 feet 10, or even upwards), their features are oval and regular, their deportment stately. Corpulence is rare among them; the old tyrant Feysul is perhaps stouter than any of his subjects, but this may be considered in keeping with his position. Their endurance of fatigue, their patient courage, their daring in war, the prudent reserve of their conversation, are well known, proverbial indeed throughout the East; and to these qualities in fact they mainly owe the authority which they exercise, too often in an arbitrary fashion, over their neighbours. Their generosity and hospitality have been often much celebrated, and deservedly so. Nor is it an exaggeration to say that in no part of the world, of Asia at least, does a stranger meet with a kinder, a more liberal, or even a politer reception than in Upper Nejed.

But these good qualities are counterbalanced by a great recklessness of bloodshed in war, by treachery in peace, by envy and hatred prevalent among them to an almost incredible degree at all times, and finally at the present day by a fanaticism exceeding that of the cotemporaries of Mahomet himself. Immorality, in the common acceptation of the term, is no characteristic of the Arab race; and the odious vices which disgrace their Persian neighbours are little known among them, or, if detected, are severely punished. Under the Wahhabite system morals seem, however, to have generally grown laxer than formerly; and fanatical bigotry tends to usurp the place of responsible feeling.

Dress is very uniform throughout Nejed. The cotton handkerchief, now black, now white, now in red and yellow stripes, or Kafeeyah, on the head supplies the place of the turban, here in ill repute; two long white shirts, of cotton or home-spun wool, often embroidered here and there with red and blue, and of which one at least is furnished with a breast-pocket destined for a small Coran, and lastly a long and very slender plaited leather girdle, going round the body five or six times, sometimes more, and worn not over but under the shirts, next to the skin, complete the ordinary and in-doors attire. On going out of doors, the Nejdean, if he be in tolerable circumstances, will put on a third and somewhat cleaner shirt over those worn at home, and throw over his shoulders a black cloak of woven wool or of camel's hair (in this latter case the colour is reddish brown) embroidered with red about the neck and breast; then put on his open sandals of country make, and lastly, take in hand a thin wand or staff, generally of the Sidr, or of the yellow wood of the Nebaa, whence in old times bows were manufactured; and thus equipped issue on the street.

Few comparatively wear the 'Akkal or head-band round the Kafeeyah; and when they do, it is of varying form and colour, sometimes white, sometimes black, or striped alternately white and black, or lastly of a reddish brown; the 'Akkals of this last colour are generally very long, going three or four times round the head, and of loose texture, they are preferred by men of rank and distinction. The poor not unfrequently substitute for the 'Akkal a mere end of rope. But those who are in any way invested with a religious or a lettered character, such as an Imam or clerk, a Khateeb or preacher, a Kadee, a Meddey'ee or "zelator," a Metowwaa' or instructor (literally "one who enforces obedience to God") must nowise wear it, as this sort of head-dress is supposed to have too profane and worldly a cut. In compensation, hand-staffs of these classes are uncommonly long.

We may add that the shirts, though always cut out and sewn in the country, are often of European or American cloth, brought from Bagdad, Damascus, or Mecca, nay, even from India, through the seaports of Hasa and 'Oman. But in Aared and Yemamah this article of dress is not unfrequently manufactured of country-spun wool, or even of native Arab cotton. This latter material is white in Nejed, but a reddish variety abounds and is much employed in 'Oman. The shirts themselves are long, reaching from the neck to the ankles of the wearer, and not slit up at the sides, but very large and easy. The sleeves are often of an exaggerated width and length, and have to be continually tucked up. They end in a point, and, when stretched out, look like gigantic wings.

The climate is, as might readily be supposed from the latitude, generally hot during the daytime, and the sky almost cloudless. Yet the breeze is rarely otherwise than cool, especially on the table-land itself, and the nights are almost always so. In winter the cold, even in the Aared, is very sensible, and every one is glad to have his wood-fire lighted regularly morning and evening throughout the winter months. Coal is indeed to be found in Sedeyr and in Southern Toweyk, but the inhabitants are ignorant of its use. Rain falls, occasionally of course, from November to February, or even March, and is sometimes heavy; I have seen it preceded by a thunder-storm, but electric phenomena are somewhat uncommon here. Between March and November the weather is uniformly clear and dry.

Riad, the actual capital of Nejed and of the Wahhabee empire, is a fortified town, containing rather less than 30,000 inhabitants, and surrounded by the fertile gardens which give it its name. Here we remained about fifty days, guests at the court of the old king Feysul Ebn Sa'ood and his son 'Abd-Allah, as physicians in the town.

The total number of provinces belonging to the Wahhabee empire is eleven, namely, Sedeyr, 'Aared, Washem, Aflaj, Yemanah (these five constitute Nejed-el-'Aala, or Upper Nejed), besides Kaseem on the west, Wadi Dowasir, Wadi Soleyyel, and Hareek to the south, and Hasa and Kateef on the east. The entire population is about 1,700,000, the military force about 60,000. The government is an absolute monarchy; but its weight is shared by a Prime Minister (Mahboob, son of a Georgian slave-woman), a Minister for Foreign Affairs (Abd-el-'Azeez, a Nejdean), the Kadee 'Abd-el-Lateef, great grandson of the first Wahhabee, and a council of twenty-two Meddey'eeyah, or "zelators." Agriculture, pasture, and war are the main occupations of Nejed. Commerce was once so, but it has much gone down under the Wahhabee system; nor is there any considerable manufacture, except what belongs to shoe or sandal makers and blacksmiths.

Quitting Aared and Yemamah, to follow the Wadi Soley, we cross the furthermost highlands of Djebel Toweyk eastward; fill our water-skins for four days' provision at the wells of Oweysit, on its extreme verge, and then traverse the arm of the "Dahna," or great desert, that immediately succeeds it. Here we toil for about 80 miles, till on its eastern margin we reach the desolate and waterless labyrinths of Wadi Farook, where our guides, though well accustomed to the country, nearly lost their way. About 15 miles more, and we reach the first coast-range of Hasa, and descend the wild and abrupt passes of Ghar and Ghoweyr, to the sea-coast level, a little south of the town of Hofhouf, capital of the province.

Here we find ourselves at once in another climate, and in an entirely new region. From the limits of the Djowf to the furthest boundaries of Nejed and Djebel Toweyk, we have met with no running stream (except a very small one of no importance between Djeldjil and Roweydah, in Sedeyr), no above-ground watercourse; wells and buckets supply the land as best they may. But here the waters gush out on the face of the earth in numerous rivulets, or, where yet confined in wells, stand brimming at the margin. One large fountain, about six miles north of the town of Mebarraz, furnishes from its deep and circular basin no less than seven streams, each one sufficient to turn a good-sized mill, and hence its name of Omm Sebaa, or "Mother of the Seven." The central basin measures about 60 feet in breadth. Other similar springs, especially in the neighbourhood of Hofhoof and Kelabeeyah, overflow large tracts of ground, rendering them complete marshes: and further on the waters of Wab extend far towards the sea, though they do not actually reach it.

One peculiarity of these sources throughout the Hasa is, that they are all hot, some to such a degree as to pain the hand if suddenly immersed in them, others of a more moderate warmth, but all of them are considerably above the ordinary and atmospheric temperature. The country is indeed said to be seldom visited by earthquakes of any importance, but in a minor degree they are not uncommon; and one mentioned to me as having occurred within the memory of man was described as having been rather serious, enough to cause clefts and fissures in the walls and houses of Hofhoof, of which I myself was witness. So far as Arab inaccuracy in dates permitted me to ascertain, it seems to have been coincident in epoch with the great earthquake which in 1836 caused so much destruction throughout Syria and Palestine. Nor is the fact surprising, since the province of Hasa forms the southern extremity of a continuous valley, reaching in a north-westerly direction up to Djezirat-Omar above Mosool, and even to Diarbekir, while its basin extends from the Anti-Lebanon and the mountains of Adjeloun in Palestine, to the frontiers of Persia, and comprises a district well known for past and present indications of subterraneous volcanic agency. This is the valley of the Euphrates and Tigris, opening out from the mountains of Armenia and Curdistan down to the Persian Gulf, on whose shores and in whose hollow lies the province of Hasa.

Among the hot sources of this region one requires special mention. It is the sulphurous spring named 'Eyn-Nejem, or "Fountain of the Star," south-east of Hofhouf, and once the resort of numerous invalids, especially of those afflicted by cutaneous disease or leprosy (common enough here); cures of paralysis are also recorded, but I suspect these last to have been rather *synchronous* than in the order of cause and effect. But within the last five years, the old Wahhabite autocrat, Faisul, caused the source to be entirely choked up with stones, and the little cupola which surmounted it to be destroyed; because, said he, the inhabitants of Hasa placed their confidence rather in the healing properties of the water than in God alone.

Vegetation is of course very abundant here, and assumes a semi-tropical character. Cotton, rice, and indigo are grown in this province, but in small quantities; it would be easy to extend their cultivation. A main source of revenue is the date-tree, which in these lands attains its *ne plus ultra* of abundant and excellent fruit. No dates throughout Arabia equal or even come near to those of Hasa, especially the species surnamed the Khalas (*i. e.* "quintessence); they are cultivated principally in the southern districts, and form an important article of exportation.

Much manufacture is also carried on, both in weaving and in metal-work, in gold, silver, copper, brass, and even in iron where melting is not required. The skill of the inhabitants in weaving and embroidering cloaks and other garments is really admirable, and their taste judicious; silk, wool, and gold-thread, are the materials principally employed. The merchants of the province carry on a considerable trade with Bahreyn, Persia, and India, especially with the ports of Kurrachee and Bombay. Most of the Arab horses sold at the latter localities are brought thither from Hasa. The principal imports in return are rice and cloth, besides arms, glass-ware, and the like.

The general aspect of the land is sandy; the soil is light, and often intermixed with powdered limestone and mica. Yet it is highly fertile, and the landscape is much greener than in the central provinces. Dwarf-palms, trees of the acacia genus, or the crab-apple-bearing Nabak, spring up everywhere without any assistance of culture, even where water does not find its way to the upper surface. The country is for the most part level, though some sand-hills and limestone-ranges are scattered about it; these latter are low, and fantastically cavernous. The whole plain slopes gradually seawards, but before finding the level of the Persian Gulf it has to take a yet further dip of a hundred feet or more. The coast itself abounds in anchorage, but the water is generally too shallow to admit ships of large burden in the creeks, which serve as harbours for the fishing-smacks of the Arabs.

Inland a long white range of craggy hills bounds the province, and separates it from the sandy waste of the Dahna. A similar, and, so to speak, exceptional, range of bold outline, though of moderate elevation, lies near the sea along Kateef. Northwards the hills dwindle down, and at last disappear, while a barren tract of firmer soil succeeds them, and forms the upper extremity of Hasa towards Koneyt, thus separating the more fertile portions of the province from the neighbourhood of Zobeyr and Basrah.

Southward also the hills disappear for a while, and there the province, if we except a very narrow strip connecting it with Katar and the immediate sea-coast, merges in the Dahna. There is only one pass to Nejed across Djebel Toweyk: it is that by which I came; and it is one too many for the inhabitants.

The inhabited towns and villages are here numerous, and the ruined ones yet more so. Hofhouf covers an extent of ground which might well enclose 40,000 inhabitants; yet it contains at the present day only about 23,000. The same may be said of many other towns still in part remaining; of Djoon, Mebarraz, and Hedeeyyah: Kateef itself is two-thirds in ruins. Everywhere I met with the marks of decayed opulence and prosperity.

The palace of the old Carmathian chiefs at Kateef, in a richly-decorated half-Persian, half-Arab style of architecture, yet standing after more than eight centuries, though in a sadly dilapidated condition, would merit a much ampler description than I can here afford to give. The enormous quadrangular fort of Hofhouf, forming itself a very considerable quarter of the town, with its massive towers, about sixteen on each side, its keep, its deep surrounding trench, and its well-guarded portals, is a most imposing monument, and a reminiscence of bye-gone days of strength and power.

Pasture-lands are here of far less frequent occurrence than in the Nejed, and cultivation occupies a much larger proportion of the soil. Hence sheep are fewer, and meat dearer. But a very good breed of asses, much resembling those of Egypt, abounds here; their ordinary colour is white or gray. This same asinine race extends down along the coast to 'Oman, where they are even more plentiful, and supply a constant export to the island of Mauritius and elsewhere. Oxen are also often to be met with, and I saw a few buffaloes in the marsh-lands near Hofhouf. However the choice animals of Hasa are its dromedaries, which are only inferior to those of 'Oman. Light in colour, graceful (so far as such a creature can be) in form, easy, most easy, in pace, and wonderfully docile, with hair almost as fine and soft as a cat's, they are as good specimens of that species as one could wish to see. But, like all the camel race, they never acknowledge the smallest attachment to their master or rider, and if once turned fairly loose, will never take their way home again; their docility is, in fact, of a merely passive kind, and not arising from any sort of sympathy or gratitude, such as is at times found in the horse or elephant.

The people of the land are of quieter and more industrial and commercial propensities than the dwellers of Nejed. Good poets and learned men, at least in Arab lore, are not uncommon here, and they are all "in battles much delighting," but in verse, and when seated in the shade, pleasure-parties, songs, and much dissipation, often diversify their life, otherwise a busy one; in intelligence they are no less superior to the Nejdeans than they are inferior to them in military qualities and in physical force. Accordingly they submit without resistance to the Wahhabite tyranny, though hating it bitterly, and not without cause, since it has ruined them. Besides they are nowise indifferent to the pleasure of wearing gold and silk, and smoking tobacco—both abominations in the eyes of the Wahhabites, who put them down wherever they can. Unable to venture on open opposition, the people of Hasa bear it all as they may, and wait for better times.

Of their religious tenets—a most curious and complicated question—I say nothing here, for fear of being led too far by the historical research or philosophical explanation requisite in a serious examen of this point. But those who consider the close neighbourhood and intimate connexion between this coast and Persia, and who remember the origin of the Batiniens and Carmathians in these very districts, may conjecture much not far from the truth. And if we add the imperfectly suppressed Sabæan belief and practices, in a land so far removed from the great centres of Mahometan action, it will appear how tangled a skein is given to unravel here, and yet more in 'Oman. That task I accordingly reserve for another and fuller description of Eastern Arabia.

The climate of Hasa is far warmer than that of Nejed; house fires, even in January, are out of the question, and cloaks are only worn in the winter season. Indeed, one could sleep in the open air almost all the year through. But the air is moist, and health is at a lower standard here than in central Arabia, especially in the marshy low grounds about Kateef, where intermittent fevers, with all their train of organic evil, are remarkably prevalent.

We have yet to consider the islands of Bahreyn and the provinces of Katar and 'Oman.

From the port of Kateef I crossed in a small Arab smack to the sea-port town of Menamah, situated on the north side of the island Bahreyn, and opposite to the corresponding roadstead and island of Moharrek. The sea-arm between Kateef and Menamah is extremely shallow; at low water navigation is hardly possible; and at high tide the ripple barely reaches the summits of the palm-branches planted here and there in the ooze, in form of a quadrangular enclosure, for the purpose of capturing the fish whose ill fortune may bring them within the leafy walls.

The strait between Menamah and Moharrek is narrow, being less than two miles across, and so shallow that at ebb-tide a man can easily wade from one island to the other. Menamah is a large sea-port town, containing about 25,000 inhabitants, or rather more, with several extensive market-places, a noble castle on the sea-edge, for the Vice-Governor, Alee Ebn Khalifah (the Governor in Chief, Mohammed Ebn Khalifah, resides at the town of Moharrek; he is dependant on the Sultan of 'Oman), and several large and handsome houses two or three stories high, but now for the most part falling into decay; Wahhabee invasion and bigotry having much injured the commerce and prosperity of Bahreyn.

The island itself is about 70 miles in length, and nearly half as many in breadth. It is in general very flat and low, a mere shoal hardly 20 feet above the sea-level, especially towards the north and west. To the east, however, it boasts a range of mountains, or rather hills, whose highest peak hardly appears to exceed eight or nine hundred feet, though the flatness of the intervening level renders it very conspicuous. The soil is in most places fertile, but not in dates, which are mainly imported hither from Kateef. In compensation, rice and potherbs, and some fruits, especially very fine citrons, are grown here. Water abounds throughout the island, but it is often brackish.

The main support of the inhabitants is from a twofold source—commerce and fishery. The former is (or rather was, for it declines daily), of great activity and an extended circle; an uninterrupted stream of trade flowing between Bahreyn and the coasts of 'Oman, of Persia, of Sinde, of India, besides Kateef, Abou-Shahr, Koweyt, and Basrah. Even at the present time, when this activity is much slackened, large sailing-ships, some constructed in the island itself, others at Linja, on the Persian coast, others at Koweyt or in India, are continually coming in and going out of the harbour; bales of goods landed or embarked, sailors, custom-house officers, porters, merchants, crowd the quay: it is a busy scene. The various branches of the market-place are thronged by Persians, Nejdeans, Omanites, Mogols, Sindians, Indians, negroes, till the narrow alleys are well-nigh choked up. There are here alone more shops and artisans in cloth and metal than in all the towns of Upper Nejed put together, and they would be much more numerous yet were they better encouraged.

Coffee-houses, prohibited in the Nejed by Wahhabee scrupulosity, here abound, and are filled by merchants, sea-captains, and all who desire a rendezvous for business or the news of the day. The mosques are, though for other reasons also, proportionately neglected. Drums and fifes, singing-bands, and noisy marriage processions, go about in the day and break the silence of night, to the delight of the "Baharineh" (as the inhabitants of the island are styled) and the great indignation of the Wahhabee stranger, somewhat out of his element here.

Meanwhile a large proportion of the population is employed in the pearl-fishery. Hundreds and hundreds of boats from the sea-coast towns and hamlets ply the shallow waters around the island, from April to November, and meet with great success. On these boats the local government levies a sort of poll-tax, besides a fixed duty on the pearly harvest, and of the sum thus collected a rated quota is transmitted to 'Oman. The principal market for pearls is at Bagdad and among the Jews of that city, who enjoy an almost exclusive monopoly of the trade.

Fish of all kinds abounds off the coast, and constitutes the chief article of food in the island. Mackarel, flounders, lobsters, crabs, shrimps, and the rest, are here incredibly cheap. I found the average prices in the fish-market at about one-twentieth of those at Beyrouth. On the other hand, mutton and beef are dear and bad. Camels' flesh, so common an article of consumption in Nejed, is here almost unknown, and no great loss either.

The climate is remarkably mild, never cold, and seldom oppressively hot; its prevailing feature is great dampness. It is in consequence not very healthy; indeed, few places afforded me a better field for medical practice during my journey than

Bahreyn. The physical type of the inhabitants is widely different from that of central Arabia, though somewhat resembling that of Hasa; they are for the most part small, slender, and not of a muscular appearance; somewhat, indeed, bordering on the Indian race. Their origin is an exceedingly mixed one; they own some Arab blood, more Omanite, and yet more Persian. Who were the first tenants of the island we shall see further on. They have, however, in spite of their hybrid character, a very peculiar and distinctive cast of features, and an intelligent, though hardly an animated look. Many Hindoos are settled here as merchants and traders, and amass large fortunes; they observe the same customs and manner of life as in their own country, and never intermarry with the "Baharineh." Arabs of pure race, and Persians are also to be met with as inhabitants of the towns, but alliance soon renders them undistinguishable from the predominant population. A small colony of Jews also lived not long since at the Menamah, but the arbitrary despotism of Mohammed Ebn Khalifah has driven them away.

The Wahhabee monarch has for some years past exacted a yearly tribute of about 1800*l.* from the island. This affords him an opportunity of sending hither from time to time his servants or slaves, and of exercising by their means a baleful influence. In fact, the actual government has, mainly in consequence of direct or indirect Nejdean interference, been rendered so oppressive, that thousands of the inhabitants, without exaggeration, have recently abandoned their native island, to seek some freer and more tolerant station. Maltese (though from a different cause) are not more common on the sea-ports of the Levant, than "Baharineh" on the entire coast-line of the Persian Gulf. The little island of Gès, lower down this sea, the harbours of Linja and Bander-Abbas, those of Bedaa, Dowha, and Wokrah, in Katar, and Scharja, Fajirah, Sohar, Seeb, Matrah, and Maskat, in 'Oman, are literally peopled with natives of Bahreyn, settled there within the last few years only. Wherever they come they soon distinguish themselves among the surrounding masses by a marked superiority in commercial and industrial skill, which reflects little credit on the authors of their expatriation.

The island of Moharrek is much smaller than that of Bahreyn, but the main sea-port, homonymous with the island, is little inferior to Menamah itself in extent and population. The Arab element in Moharrek somewhat predominates over the Persian; and commerce is here less active than in Bahreyn. The island itself is throughout low and level, but its sandy soil is much drier than that of the sister shoal, and its climate is considered to be more healthy. A square-built fortress of tolerable strength commands the eastern entrance of the channel between the two islands, but it is now much neglected, and only serves as a sort of stable for the horses and dromedaries of Mohammed Ebn Khalifah. A similar but much larger fort—a castle, indeed—exists, though entirely dismantled, on the main land of Bahreyn to the east of Menamah.

The number of villages on the two islands taken together is about eighty in all; some of them which I visited are of considerable dimensions, although the houses are for the most mere palm-branch sheds, such alone being required by the mildness of the climate: at intervals, however, large dwellings of brick and stone, and whose appearance is not inelegant, are interspersed among the huts of the poor.

Let us now cross over to the adjoining lands of Katar. This province embraces almost all the peninsula denominated in many maps as Bahran—an appellation, by the by, which I never heard used by the inhabitants—as well as the greater part of what is commonly called the Pearl Coast. It is dependent on 'Oman, through the medium of its numerous local chiefs, the principal of whom, Mohammed Ebn-Thanee by name, a fine old man, and famed for great prudence and gentleness of disposition, resides in the seaport town of Bedaa. But he has no direct power over the other chiefs, such as the respective governors of Wokrah, Zabarah, Soor, &c. Mohammed Ebn Khalifah, of Bahreyn, exercises a sort of general influence throughout the district.

Its prevailing character towards the mainland is extreme barrenness; there are hardly any gardens or cultivated fields; water is scarce, and the wells deep; their supply barely suffices for domestic use, much less for irrigation. It is, in fact, merely a narrow strip of meagre pasture-land among the low hills which rise close to the coast, and thence stretch back for some distance towards the interior. Numerous villages, however, above forty in total number, stud the coast; but their maintenance comes from the sea, not the land. The population subsists almost exclusively by the pearl-fishery, here, perhaps, the most productive known on any point of the globe. Its season is from the end of March to about the middle of November. But the continuance of frequent and protracted diving gives rise to much disease among the inhabitants, and they are physically as well as morally, for the most of them, but a sorry race.

All along the inland hills, the diminished continuation of the Hasa coast-range, are placed from distance to distance round watch-towers; they serve also as forts and places of refuge for the Katar pastors when attacked, which is frequently the case, by their troublesome neighbours, Benoo Yass and Menaseer, or the restless Bedouins of Aal-Morrah. The entrance to these towers is pierced in the wall at about 12 feet above the ground, and can only be reached by a rope hanging from it, which is afterwards drawn in again by those who have clambered into the interior in case of siege. Beyond these hills extends a little pasture-land, where the Bedouins already mentioned graze their camels, and behind this the immense and hopeless sand-waves of the Dahna as far as Yemen.

The air is dry, and colder than the climate of Bahreyn, though further south. The adjoining sea is very shallow; the people of the coast call it "Bahr-el-Benat," i.e. "the girls' sea," in derision of its calm and pool-like appearance. Indeed the flux and reflux of the tide, here once only in twenty-four hours, while at Bahreyn it is regularly once in every twelve, seems alone to preserve its shallows from utter stagnation. It is foully muddy, and produces abundance of fish, besides the pearl-oysters. Its waters are full of zoophytes, and highly luminous at night; indeed so is the whole extent of the Persian Gulf, even where at its deepest. This phenomenon is ascribed by the Arabs to the glare of hell-fire, situated, as they will have it, immediately under the sea-bed, which in pursuance of this theory must be transparent, probably of glass. But on that point the Arabs (Nejdeans, of course) could not give me any positive information. Innumerable islands (I have heard forty enumerated one after another) stud the bay, but few of them possess springs of fresh water, though some—for instance, the isles of Faroor, Halool, and Aboo-Moosa—are of considerable size and mountainous. On this last I was obliged to pass two days, owing to a storm, and had thus ample time to explore it "from the centre all round to the sea." It is evidently volcanic, contains a central peak of considerable elevation, and owns a scanty source of brackish water.

Between Katar and the nearest limits of the province of Sharja, namely, the village of Aboo-Debee, the desert comes right down to the sea for a length of near 100 miles. The marauding and assassinating Bedouins of Beni-Yass, formerly pirates too, though now repressed at sea by the British flag, occupy this unfertile spot. The only village here of any consequence—a small town, indeed—is Soor: like the others, it subsists by the pearl-fishery.

From Aboo-Debee, the whole coast, with its inland provinces, on Ras-el-Hadd, and even round it to the south-west as far as Dofar, bears generally the exclusive title of 'Oman: this denomination is, however, rather political than geographical, and denotes that the supreme authority of the Omanite Sultan, Thoweynee Ebn-Sa'eed, is through this extent more immediately and fully exercised than in Bahreyn and Katar; though Khaled Ebn-Sakar, the local chief of Sharja, has of late years established his almost independent and arbitrary rule over the greater part of the Cape of Ras Mesandom, namely, the three provinces of Sharja, Roo's-el-Djebal, and Kalhat, which compose it.

The narrative of Captain Wellsted gives a tolerable idea of much of Oman; but it is not a complete one, for that enterprising traveller visited the kingdom at the time when the Wahhabee armies were harassing its Northern and Western provinces; and besides ill-health abridged his researches, already much narrowed in their sphere by his avowed European character: for though the excessive jealousy against foreign and especially against European travellers prevailing throughout Nejed is much mitigated in 'Oman, there yet remains even here enough of such a feeling to render the natives very unwilling to let foreigners see the best of their land or the wealthiest of their towns, for fear lest cupidity should thus be over-excited and occasion given to encroachment or other disagreeable results.

Nor was I myself able to examine in person the interior regions so fully and extensively as I should have much desired. Of this the main reason was, that a long-protracted journey and the endurance of much hardship of every kind, had so far weakened my health and undermined my strength, that I felt at last hardly able to bear up from day to day. In fact, the ultimate resolution of the matter was in a typhoid fever. However, I managed to pass nearly two months in this angle of Arabia before my final break-down, and in addition to what this period of time gave me opportunity of visiting in person, an easy intercourse with the unsuspecting inhabitants gained me much and valuable information on many other points. I will now accordingly specify some of the more remarkable features of this land and people, so far as I then became acquainted with them, and thus conclude the present narrative.

'Oman, to take this denomination in its widest territorial application, is a development of the coast-range which girds Arabia; and nowhere else does the mountain-chain attain equal height or breadth. The main back-bone of this region is the ridge named Djebel Akhdar, or "the Green Mountain," whose highest peaks rise inland behind Barka and Maskat at a distance of about 60 miles from the coast, while its bold summits extend in an uninterrupted line north-west by north to Cape Mesandom, and south-east down to the neighbourhood of Ras-el-Hadd. Its average distance from the sea is about 40 miles; but it approaches much nearer at Ras Mesandom, in which it finally merges, while towards the Batinah and Djaïlan it recedes far inland.

This central chain gives off several others, which afford the skeleton plan, so to speak, of the whole region. Thus, near its northern extremity, it furnishes a series of hills named Djebel 'Okdah, and leading south-west to the town of Bereymah, now a sort of Nejdean colony, where they attain a considerable elevation. They then turn south-east and run in a line parallel to Djebel Akhdar, but at a considerable distance from it: this range assigns the limits of the Dahirah, or inland province. Another chain of mountains, at their first outset mere barren rocks, but soon rising to a great height, originates at the coast near Barka, and follows the sea-line close to the very shore down to Soor; meantime it communicates with Djebel Akhdar by transverse ranges occurring between Barka and Maskat: these form the boundary of the Batinah. Beyond Soor these same hills form a vast loop running round the inner line of the Ras-el-Hadd promontory, till it at last meets the Dahirah to the rear of Djebel Akhdar.

These mountains, especially the coast-range, and the Djebel Akhdar itself, are mainly basalt and granite, with mica, quartz, and spar intermixed. But to the south and east chalk and limestone begin to predominate, and the low hills that follow the coast from Ras-el-Hadd downwards towards Dofar were described to me as being principally of that formation, though some are, if I have rightly understood, basaltic also.

Beyond and behind the Dahirah lies the desert already described. From the heights behind Sharja I could distinguish no break in its reddish waste; but, if my Bedouin informants be correct, there occurs, at a certain distance from the Dahirah, a long low range of white (*i. e.* limestone) rocks and sand-hills, called by them the Akhaf, and forming a sort of outwork to the 'Oman range. These same hills are mentioned also in a well-known Arab work, the 'Hamasah' of Abou-Temmam. Possibly Wadi Djebrin, put down in some maps, though no one in this country could tell me anything about it, may be a valley among or coincident with these same Akhaf.

Such is the general outline of 'Oman—an outline mostly filled up by fertile and cultivated lands: those lying between the sea and Djebel Akhdar, namely the province of Batinah, are especially rich in produce, except where the rocky coast-line interferes. The vegetation of the Batinah is almost Indian; the cocoa-nut mixes with the date-palms and overtops them—the mango-tree spreads its broad deep shade—the betel-tree and *papay* adorn the gardens—long tropical climbers stretch from bough to bough—and under all runs a meandering network of rivulets, supplied from the inland mountains, or welling up through the level soil, to give a degree of life and verdure such as no other part of Arabia can show. It is, indeed, the garden of the Peninsula. Numerous villages and some considerable towns adorn this province: I will speak of them separately a little further on.

Djebel Akhdar also, with its continuation in Belad Benoo-

Abee-Alee, and Djailan, encloses many fertile valleys, full of rich vegetation and considerable produce. The villages, clustering house above house on its sides, reminded me of the more populous districts of Lebanon above Beyrouth in Syria; and vines, whose wine is said to be good (but I did not taste it) abound on the slopes. Running streams of water are here frequent, but none reach the sea except as winter-torrents. Here, and in the Batinah, I met with the *pipul* or *aalei* tree of India. Date-palms are common and vigorous; but their produce is inferior to that of Hasa. The sugar-cane, coffee, indigo, and cotton, both white and red, thrive here: this last is very abundant; the coffee is much inferior to that of Yemen, and resembles rather the Indian variety. Bees abound in the mountain, and furnish excellent honey of a whitish colour.

The mountains themselves are sometimes bare—more often wooded, at least partially so; hence their appellation of "green." The inhabitants are a very peculiar race, and offer somewhat of an Abyssinian type; they profess themselves of the old Cahtanite stock, established in Southern Arabia many centuries prior to the Ismaelite Arabs, and believe that their ancestors emigrated hither from the Yemen at a very early period. Some, however, lay claim to belong to certain Yemanitic or Nejdean tribes of a later date; such are the Fezarah in the Batinah. They are ruled by local chiefs, all of whom, however, owe allegiance to the common monarch of 'Oman; but the government is much more restricted and constitutional, while less mechanical and centralised, than that of Nejed. The most powerful and the most ancient family is that of the Yaaribah, who are said to be descended in direct line from Yaareb, son of Cahtan: they were formerly the rulers of the whole of 'Oman till supplanted by the family of Sa'eed, who attained the sovereign power about 140 years ago, and still possess it. The Ghafaree and Djelundee are other powerful families of chieftains; they inhabit mostly the south-east of the province.

Maskat being the seaport most frequented by Europeans, is also the best known, and I may well be excused from adding here my description to that of so many preceding travellers. But though a town of great importance, it is not after all the real capital of the kingdom, nor the authentic and official residence of the sovereign. Three towns are acknowledged in 'Oman as holding that rank, namely, Sohar, Nezwah, and Bahholah. Of these the last is said by all such as have visited it, which want of time and illness prevented my doing, to be much the largest and the most ornamental in the kingdom. A very intelligent native of Hasa, by name Ebn Khamees, who had remained some time resident at Bahholah, described it to me as surrounded by a triple wall of remarkable height and strength, with a spacious and vaulted market-place or "keysareeyah," as they here call it, in the centre; the houses are, by his account, of three stories high, the streets large and regular, the buildings of stone. He mentioned the approach to it, by a wooded mountain-gorge, as very beautiful; and finally, gave an estimate of the number of dwellings in the town, which would make the inhabitants near 30,000.

Sohar, where I passed many days, is allowed by every one here to be much inferior to Bahholah in every way, and yet possesses much of that ornament and strength which popular report attributes to the latter, and its actual population appeared to me, although it has much diminished of late years, certainly above 20,000. Hence we may conclude that the above account of Bahholah, confessedly its superior, is not much exaggerated; and certainly the great amount of gold and silver workmanship, of the most delicate quality, which I have seen brought from Bahholah for sale in the towns of the Batinah, at Matrah, Maskat, and elsewhere, implies a thriving market and a wealthy town. Nezwah is, at least, equal in size to Sohar, but less dilapidated. It is a frequent summer residence of the king, or sultan (as he is here called), Thoweynee: a considerable manufacture of sweetmeats, by no means despicable, is here carried on.

In no other part of Arabia did I meet with stronger marks of advanced and long-established civilization than in 'Oman. Large stone-built houses, three and even four stories high, with ample and variously carved vestibules, vaulted passages, painted walls, and copious furniture for every use; hospitality and courteous welcome, outdoing even that of Nejed; politeness in conversation, cleanliness and ornament in dress, and much else of the same nature. I will touch on a few points, which may help to give a tolerable and distinctive idea of this people.

The dress of the Omanites is very different from that already described as worn in Nejed. Here, instead of the long Arab shirt, a broad band of cloth, reaching from the waist to the knees, and very generally bordered with silk, is worn round the loins; over this is put on a long gown of red cotton, often embroidered with blue silk, and above all a light gold-embroidered cloak of camel's hair, or of light wool. The head is covered with a large turban, not unfrequently of Indian make, and sandals, much more elegant and stronger in make than those of Nejed, are here indispensable, owing to the dampness of the soil. Every free man—and slaves, too, if belonging to wealthy masters—wears at his embroidered leathern girdle a short and crooked dagger, whose hilt is often made from the hoof of the giraffe, and richly ornamented, no less than the sheath, with gold and silver filigree. I have seen both hilt and sheath of gold (gilding is unknown here), oftener of silver: this weapon serves, however, not unfrequently for decoration, but for use also. A large sash, generally white, is girt round the waist;

over the belt and dagger, around whose handle it forms a kind of sword-knot. Crooked wands are here the fashion instead of straight, and a good one of yellow Nebaa wood is much prized. Smoking is more general here than even in Syria. I should have mentioned before that tobacco is one of the main growths of the country: it is good and cheap, but somewhat strong. Coffee-houses abound; and the form of pipe there prevalent, and in the private dwelling-houses, is the Persian, or Nargheelah. I wonder how Niebuhr, a writer in general of the utmost accuracy, can have stated in his Notes on this part of Arabia that smoking is here ill looked upon. Possibly his informant belonged to the Wahhabite sect, and gave his own sentiments as a standard for those of the country.

Gaiety and fondness for social amusement, industry and commercial activity, are characteristic of the Omanite race: they are mild, good-humoured, and cheerful. The women of this province are of remarkable and far-famed beauty; few Asiatic regions can in fact afford their equals, whether in form or face: their stature, too, is taller and far more graceful than is common elsewhere in Arabia, nor is the veil common among them. When attacked, the inhabitants of 'Oman fight bravely, as their wars with the invading Wahhabees, and even occasional skirmishes also with Indian troops, have attested; but they are too fond of mercantile, mechanical, or agricultural pursuits to be much given to war, though in bravery they excel the people of Hasa. Their country has considerably suffered for many years, and still does, from repeated Wahhabee attack or interference, and nowhere is the Nejdean so cordially hated as here.

The Dahirah, a province which outlies Djebel Akhdar to the south-west, is more barren than the rest of the kingdom; its inhabitants have a half-savage appearance: they mostly go armed with short spears or javelins, besides the never-failing dagger at the girdle, and are evidently poorer and less civilized than the inhabitants of the Batinah. But the wildest population by far are the denizens of Ro'os-el-Djebal, *i. e.* of the Cape Mesandom itself; their mountaineer dialect can hardly be understood even by their immediate neighbours—to a stranger it is totally unintelligible.

I may here remark, that throughout 'Oman the prevailing form of the Arabic language differs in some respects from that spoken in Nejed, where the lowest of the people employ the identical dialect of the Coran without any deviation, and with all its inflexions, desinences, and other niceties, which have been sometimes supposed to exist only in the ingenuity of grammarians, but which characterize, in fact, the living and spoken language of Central Arabia.

While in 'Oman I was often reminded with surprise of the phrases and expressions of old Ante-Islamitic poets, and heard many words elsewhere obsolete here current and in common use among the natives of the region, while they puzzle Nejdean visitors. Again, the grammatical desinences are less scrupulously observed here than in Central Arabia, though the inflexions are invariably correct. It is the old Yemanite Arabic, simpler, and more ancient, than the dialect of the Hejaz and of the Nejed.

Poets and poetry abound, even more than in Hasa; but the form of versification admits of a remarkable variety. For while some authors compose according to the laws of rhyme and metre generally admitted among Arab poets, and rigidly adhered to even at the present day in Syria, Bagdad, Egypt, &c., others follow a metre in which accent takes the place of quantity, and the rhymes are not successive but alternate, much like our own double-ballad verse. In each particular piece the length of the lines is, of course, the same, but it varies from poem to poem. This kind of composition they entitle "*Nabt*," or "*Nabtee*," *i. e.* "Nabathœan," in contradistinction to the other and more prevalent form, named by them "*Schiār-el-Arab*," or "Arab poetry."

I did not find either the versification or the title of "*Nabt*" till on approaching 'Oman; but in this part of Arabia it is by far the most prevalent. No one could tell me anything precise about its date of introduction, its origin, or whence it derived its name.

Another peculiarity of this region is the great prevalence of the negro population. This is mainly the result of long-continued slave-trade with the eastern coasts of Africa; for of the numerous dusky bands thus yearly imported into 'Oman, at least one-half remain fixed within its limits, and of these a very large number obtain their freedom—usually the case on the death of their master—by some testamentary arrangement, or even at an earlier period. They then settle in the country, marry, acquire lands, and form at the present day about one-third of the entire population. Nor is the condition of those who remain slaves much inferior to that of their emancipated brethren; for so mild is slavery here—a mere name, in fact—and so little does the negro meet from the Arab population around with that contempt and ill-usage, or those restrictions and inabilities which their sable brethren, even after emancipation, sometimes meet elsewhere, that they have here little or no reason to regret their native soil, nor do they indeed ever, unless by some very rare exception, avail themselves of the continual and easy opportunities offered them of returning thither. On the contrary, it is next to impossible to persuade them to quit 'Oman. They live sometimes intermingled with the white population, sometimes gathered together in separate villages: intermarriage between emancipated negroes and Omanites is not very common, nor yet altogether rare. In the south-eastern part of the kingdom and below Ras-el-Hadd they form, I was told, a numerical majority; but as government, whether local or general, is strictly hereditary throughout 'Oman, the blacks have no share in it.

The Himyarite population, which connects 'Oman with Hadramaut on the southern coast, appears to be an old Abyssinian colony, distinct alike from the Arabs on the one hand, and from the negroes on the other.

The climate of 'Oman is very hot, fully equal to that of Bombay and the adjoining Concan. I have myself seen ripe apricots for sale in the market of Maskat by the end of March, and grapes ripen towards the latter part of April. In the summer months all who can quit the burning coast hasten to the upland slopes of Djebel Akhdar, where an abundant vegetation, with increased altitude, affords a cooler temperature as well as a healthier air. Captain Welsted speaks of snow falling in wintertime, of course on the higher peaks of the mountain. He must, I think, mean hail, for such was described to me by the inhabitants as there occurring, though I myself did not witness it; but as I have known it to fall on Djebel Toweyk in Nejed at a much less considerable elevation, I see no reason why it should not be even more frequent on Djebel Akhdar, whose height is 6000 feet at least above the sea-level. But the people here were ignorant of the very name of snow (*thelej*), and when I described it to them, unanimously affirmed that they had never seen such a phenomenon. The words for "hail" are indifferently "*barad*" and "*djeleed*," and with these they were acquainted. Certainly in February, when I first came in sight of the Akhdar, no snow was visible on its summit, though the winter had been unusually cold and stormy.

The Bedouin population throughout 'Oman is very small: none exist in the Batinah, Kalhat, or Ro'os-el-Djebel, and but few in Djebel Akhdar. Rather more are to be met with in Belad Soor, Belad-Abee-'Alee, and the Djailan; the greatest number, comparatively speaking—for in itself it is far from considerable—wander about the Dahirah. But in 'Oman, owing to the great warmth of the climate, the fixed population, especially the negroes, not unfrequently take up their abode under slight huts of palm branches, or even in tents, instead of houses. Again, all these inhabitants, whether townsmen or villagers, white or black, when out of doors and accoutred for a journey or a war-expedition, look to a European eye exactly like Bedouins, and are in consequence set down as such; and this is, it seems, one very common source of the error by which the greater portion of the Arab population are so frequently represented as Bedouins. Add to this that as the clannish system and spirit is universal in Arabia, and appellations such as "Benoo-Abee-'Alee," "Benoo-Temeem," "Benoo-Fezarah," &c., very common throughout the country, Europeans are apt to forget that all "tribes" or clans are not necessarily Bedouins—far from it; and that "Benoo," or "sons of," is quite as applicable to a town or village population as to Kenites.

A remarkable number of Hindous and "Lootian," *i. e.* "natives of Loodianah," are settled in all the seaport towns of 'Oman. A few Parsees and some Jews inhabit Maskat and Matrah. Toleration is here the word, and religious belief or practices are neither asked about nor interfered with. This affords a strong contrast to Wahhabee bigotry; indeed the general features of 'Oman, whether physical or moral, are extremely opposite to those of Nejed. Europeans alone are here looked upon with some degree of suspicion, nor perhaps without reason.

Pearl-diving ceases from Ras-Mesandom eastwards, and the sea, here deep and often stormy, furnishes less variety of fish than the "Bahr-el-Benat." Enormous shoals of sprats and a kind of mackarel do, however, frequent the coast. Amber is not unfrequent: it is a government monopoly.

Of the inland produce I have already spoken. Dromedaries, the finest known, and asses, resembling those already described in Hasa, abound, and are frequently matter of export trade. I was told that the giraffe is to be found in the *oases* of the inner provinces; but I doubt whether my informant was not mistaken. Among the agricultural products the sweet-potato, identical with that of India, deserves to be mentioned, Coffee, sugar-cane, and red cotton are favourite articles of cultivation.

'Oman, considered as a kingdom, consists of twelve provinces and two dependencies, exclusive of Socotra, Zanzibar, and the East African Coast. These are:—1. Katar, from Ajeyr to Wokrah, capital Bedaa', with the coast of Benoo-Yass; capital Soor. 2. Sharja, from Aboo-Debee to Ra's-el-Kheymah. 3. Ro'os-el-Djebal; capital Leymah. 4. Kalhat; capital Debee. These three provinces are under the immediate government of Khaled-Ebn-Sakar. 5. The Persian coast, from Ras Bostanah to Djask, with the islands of Kishm, Larej, Ormuz, &c.; capital Linja. 6. The Batinah, from Fakan to Barka; capital Sohar. 7. The Dahirah, from Bereymah to Djebreen; capital Bereymah. 8. Djebel Akhdar, from Kata'-el-Loha to Semed; capitals Nezwah and Bahholah. 9. Belad Maskat, from Barka to Ra's-Heyran; capital Maskat. 10. Belad Soor, from Ra's-Heyran to Ra's-el-Hadd; capital Soor. 11. Djaïlan. 12. The coast from Ra's-el-Hadd to Dofar.

The dependencies are the two islands, Bahreyn and Moharrek. The total population amounts to two millions and rather more; the military force is between fifty and sixty thousand. I remained in this country above two months, most of which I passed at

Sharja, Sohar, Matrah, Maskat, and their neighbourhood. But during the last week of March, 1863, when re-embarking at Matrah for Aboo-Shahr, on the Persian Gulf, I was attacked by a malignant fever, and only owed my recovery and ultimate return to Bagdad about the end of April to the kind attentions and generous care of Captain Selby of the Indian navy.

IX.—*Notes on the Physical Geography of Vancouver Island.* By C. FORBES, Esq., M.D.

Read, March 14, 1864.

THE object of the present Paper is to deal especially with Vancouver Island; but so close is the connexion between this and the sister colony of British Columbia, that it will be impossible, in treating of the Physical Geography and resources of the one, to avoid referring to those of the other.

In reference to Vancouver Island, the points which naturally suggest themselves for consideration are—

Geographical Position and General Aspect.
Geological Formation and Hydrography.
Climate, Soils, and Resources, generally derivable from Commercial Relations, and Natural Products; and, incidentally,
The Position of the Colony in its Political Relations.

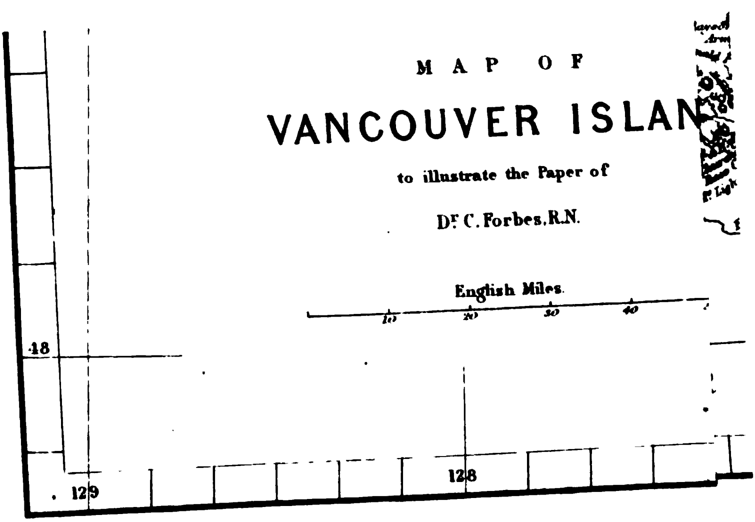
Vancouver Island, first made known to us by Cook, is situated on the coast of North-Western America, between the latitudes of 48° 20″ and 51° N.; and the longitudes of 123° and 128° W. It is separated on the south from Washington territory by the Strait of Fuca, and on the east from British Columbia by the Straits of Georgia, and by Johnstone Strait. Its shores on the west are washed by the waters of the North Pacific. Essentially a mountain ridge, its buttress-like walls descend for the most part abruptly to the shore, fringed, however, in many places, more especially on its south-eastern and eastern sides, by the undulating country, thickly wooded in general, but here and there containing patches of open grass-land.

The island is of an elongated oblong form, nearly 300 miles in length, by from 30 to 50 in average breadth, attaining, at Mount Arrowsmith, an elevation of 5900 feet. Its outline is boldly picturesque; its shores are characterised by abrupt cliffs, rocky promontories, sheltered coves, pebbly beaches, and fine harbours.

The whole western side presents a gloomy, frowning aspect. Numerous arms of the sea, fiord-like in character, penetrate between the walls of metamorphic and trappean rock, which, on either hand, rising into lofty peaks and ranging into broken sierras, or sloping

Published for the Journal of the Royal Geographical Society by J. Murray, Albemarle Street, London. 1864.

Edwd. Weller.


MAP OF
VANCOUVER ISLAN
to illustrate the Paper of
Dr. C. Forbes, R.N.
English Miles.
10
20
30
40
48
129
128

from rounded dome-shaped masses, form the buttresses of the land, opposing and resisting the fury of an ocean, for the greater part of the year anything but pacific. Along the eastern side a more open and more undulating country marks the existence of underlying sedimentary rocks, which, in the form of carboniferous sandstones and limestones, at intervals fringe the coast.

The whole country is more or less densely wooded, excepting just where the summit of a mountain affords no hold for plants, or where, as in the neighbourhood of Sooke, Victoria, Cowitchin, and Comux, limited ranges of open grass-lands occur.

In the winter the tone of colouring of the landscape is sombre, the weathered rock-surfaces mingling their purple hues with the dark green foliage of the pine. But in the summer and autumn these heavy tones are lightened by the bright colours of numerous flowering plants; by the yellow-green light that trembles in the swampy hollows from the poplar, the alder, and the aspen; and, later in the season, by the rich orange and crimson tints of the maple. The surface is beautifully diversified by mountain precipice, hill and dale, wide-spreading lakes, and solitary tarns, cut up by numerous arms and inlets of the sea; in no case does the watershed suffice to give a navigable stream. There are no rivers, in the stricter sense of the word, such streams as flow through the country being simply the short watercourses, which discharge the overflow of lakes or the surface-waters of the neighbouring ridges—torrents in winter, nearly dry in summer, valuable only as a power for driving grist and saw mills, and possibly at a future day to be rendered useful as a means of irrigation—a process by which many parts of the country would be much benefited.

As might be expected in a country having a clay subsoil and covered with material through which water readily percolates, springs are numerous and the water excellent. Where the clay, however, forms the surface-soil, some inconvenience is experienced, as in the neighbourhood of the town of Victoria.

The geological structure of the island may be briefly described as consisting of an axis of metamorphic gneissose rock, situated at the south-western extremity, having, resting thereon, clay-slates and other rocks, of probably Palæozoic age. A great deposit of these slaty rocks has existed along the whole south and west, but, in a great measure, shattered and broken up by intruded trappean rocks: it has been almost entirely removed by the glacial action which grooved and furrowed the dense crystalline felspathic traps. Associated with these are lenticular masses of a semicrystalline limestone, of great economic value. On these metamorphic and trappean masses rest the sedimentary stratified rocks, which fringe the south-eastern and eastern coast-lines, and which contain carboniferous strata of very great value. Presuming that the gneissic axis of the island is of Silurian age, the superjacent sedimentary deposits associated with erupted traps are found to be of the cretaceous and tertiary epochs.

The most remarkable feature of the geology of the south-eastern end of the island is the scooping, grooving, and scratching of the rocks by ice action. The dense felspathic trap is *ploughed* into furrows 6 to 8 inches deep, and from 6 to 18 inches wide. The sharp peaks of the erupted intruded rocks have been broken off, and the surface smoothed and polished as well as grooved and furrowed by glacial agencies, giving the appearance of rounded bosses to the numerous promontories and outlying islands which here mark and stud the coast line.

As might be looked for in a country so acted on by ice, the whole surface of the land is found in this locality to be covered by boulder drift and erratic blocks of various crystalline and other rocks sufficiently hard to bear attrition. Granites and granitoid rocks of every description are to be met with; trappean rocks, micaceous schists with garnets, breccias, and conglomerates.

From these granitic boulders and from the sandstones of the outlying islands valuable building material is obtained, some of the grey granites equalling in beauty and in closeness of crystalline texture the best granites of Aberdeen or Dartmoor.

The soils of Vancouver Island, derived from the clays and gravels of the drift that overspreads the country, and from the decomposition of the subjacent rocks, may be thus distinguished and described:—

1st. A poor gravelly soil, with a thin coating of vegetable mould, bearing large timber of a superior quality, coarse grass, and little underwood.

2nd. A calcareous loam of good quality, producing excellent crops of vegetables; very suitable for clover and other lime plants.

3rd. A rich dark brownish-black soil, or humus, resulting from the decay of vegetable matter, mixed in some localities with alluvium, of variable depth, and resting on a clay subsoil, overlying trap rock and concretionary limestone.

The poverty of the soil first described, is due to its inability to retain moisture; the second is always ready for cultivation; and the third only wants subsoil drainage to carry the heaviest possible crops of wheat and of other cereals.

The *Hydrography* of Vancouver Island has been, in all its bearings, fully detailed by Captain George Henry Richards, of the Royal Navy, in his admirable 'Sailing Directions.' Therein are shown the very remarkable peculiarities and irregularities of the tidal currents. In this place it will suffice to refer, as having an influence on climate, to the remarkably low temperature which characterises, all the year round, the ocean that washes the shores of this island.

This ocean is boreal in character, its temperature being kept low by Arctic currents which sweep down the coast, even to below the latitude of San Francisco, and by the quantity of melting snow discharged by numerous rivers and mountain torrents on the British Columbian coast. The influence of this low oceanic temperature is observable in the marine zoology, many of the shells having a boreal type.

Lines of soundings have demonstrated the existence of extensive banks on the western coast, which, abounding in fish, will one day prove of great value to the colony.

The climate of Vancouver, in the succession of its seasons and general thermal conditions, approximates closely to that of Great Britain, modified by special circumstances connected with its physical geography. Situated close to a continent the mountain-ranges of which are clothed or capped with perpetual snow, and surrounded by an ocean remarkable for its extremely low temperature, certain peculiarities present themselves to the notice of the climatologist; and these are well and specially marked in the south-east end of the island, owing to its proximity to the Olympian range of mountains in Washington territory. This range, running east and west, presents its northern aspect to Vancouver Island; and since, on this aspect, the snow remains on the mountain peaks all the year round, the winds which blow from this direction are necessarily cold and chilling. Other winds, blowing over the cold sea-water, also have this chilly feeling, and give the peculiarity to the climate, as far on in the year as the 21st of June, of a fine clear atmosphere with a bright sun, and cold winds, like a late spring in England.

The seasons in general take the following course:—After the gales with rain, which generally mark the period of the equinox, fine clear weather sets in, and continues till about the middle of November. At this period rain begins to fall continuously for days, and gales of wind are frequent on the coast. The barometer ranges from 29·50 to 30·10, and falls rapidly on the approach of a southerly gale. Rising gradually to 30·20 and 30·50, a northerly wind springs up, and three days of fine clear weather, with hoar-frost, generally follow. After the third day, the barometer slowly falls, and again the gale springs up, and the rains come down, to be succeeded, after a few days, by a rising glass and frosty weather, which, as the season advances, occasionally becomes intense, and is accompanied by hail and snow. The latter seldom lies for any length of time; the winters of 1852-53, 59-60, and 61-62, the last especially, being remarkably severe exceptions. These exceptional seasons occur in all climates, and here prove the rule that an open, wet winter characterises Vancouver Island.

There is a great amount of rain, but it is to be regretted that there is no register to show what the rainfall actually is.

The great quantity of uncleared and undrained land tends to make the spring later and colder than in England. The summer is drier, with a more scorching sun. Little or no rain falls from the middle of April till the Equinox, or the end of October. The prevailing winds during these summer months are from south-west to north-west, blowing freshly during the day, the nights tranquil and clear. Northerly winds occasionally prevail, and, blowing over the heated land, are, in the southern parts of the island, hot and dry.

The autumn of the American climate is finer than that of the European, and the fine weather (the Indian summer) extends further into the year. The winter months in ordinary seasons are much the same as in the west of England; in the severer and exceptional, more like the Midland Counties and east coast of Scotland. There are thus, as it were, two seasons, a wet and a dry. The rainfall, it may be noted, is greatest at night.

On the whole, the climate of Vancouver may be fairly described as very fine, healthy, and enjoyable; yet limited experience and partial observation lead to opposing and conflicting statements. The best and safest guide to the climatologist will be found in the statistics of Agriculture and of Medicine; having reference to the quantity and quality of produce, the nature and gravity of disease. To these points reference will be made further on, and, in the mean time, the following abstract from a meteorological register kept at Victoria in the year 1850, will show "what the weather is" in any ordinary year.

January, 1850.—Snow began to fall on the 5th. On the 24th there were 17 inches on the ground, which, however, was all gone by the 28th. For the month:—max. temp., 47°; min., 21° Fahr.

February.—Mild and open. On the 12th, gooseberry-buds were opening. Some hail, rain, and frost, towards the end of the month. Max. temp., 58°; min., 26° Fahr.

March.—Variable weather; slight snow-storms in early part, but so partial that, on the 2nd, early plants were coming into leaf in sheltered spots; native hemp was 3 inches high, elder-bush putting out leaves. On the 7th, catkins and palm-willow in full bloom. On the 29th, there was still snow on the ground, and buttercups in flower. Max. temp., 60°; min., 27° Fahr.

April.—High winds alternating with calms. Strawberries on the 13th, coming into bloom. Max. temp., 69°; min., 35° Fahr.

May.—15 fine clear days, 12 overcast, 4 rainy. On the 1st, plains covered with verdure; the twin-cup lily, heartsease, crowsfoot, jonquil, and many other flowers, in full bloom; kramass flowering, spring wheat and peas rising, early potatoes above ground. On the 4th, campaniola and lupin coming into flower, wild cherry and service-berry coming into blossom, and wild vetch flowering in warm places. On the 6th, apple-tree in blossom, strawberries forming; on the 7th, potatoes planted in March and April coming up. 12th, early beans in bloom. 18th, wild rose coming into bloom. 25th, strawberries ripening. 31st, wild gooseberries ditto. Max. temp., 78°; min., 39° Fahr.

June.—23 fine clear days, 7 overcast and foggy. On the 14th, queen of the meadow and golden rod in bloom. 17th, potatoes flowering. Max. temp., 84°; min., 47° Fahr.

July.—22 fine clear days, 9 overcast. On the 11th, barberry and raspberries ripe. On the 17th, first double rose on Vancouver Island came into flower. Max. temp., 82°; min., 52° Fahr.

August.—26 fine clear days, 5 overcast. On the 16th, distant thunder, high wind. Max. temp., 79°; min., 53° Fahr.

September.—24 fine clear days, 6 overcast. On the 7th, heavy dews. Max. temp., 74°; min., 45° Fahr.

October.—20 fine clear days, 10 overcast. Max. temp., 70°; min., 38° Fahr.

November.—13 fine clear days, 14 overcast, 3 rainy. On the 19th, a heavy gale of wind, felt simultaneously along the whole coast. Max. temp., 55°; min., 32° Fahr.

December.—10 fine clear days 16 overcast, 4 rainy, 1 snowy. River frozen on the 4th; ice quickly broke up. Max. temp., 48°; min., 14½° Fahr.

There were thus, in the year 1850, 201 fine clear days, 97 overcast and foggy, 50 rainy, and 17 on which snow fell: these latter in the four first and two last months of the year. In the year 1860-61 there were 186 fine clear days, 97 rainy, 78 overcast and foggy, 4 snowy.

The experience of the last twenty years has shown that, at irregular periods of from five to seven years, winters of great severity may be expected. In 1846, 1852-53, 1859-60, and in 1861-62, the frost was intense, and the fall of snow heavy. In neither of the two former cases, however, was it in any way so severe as in the latter year.

On the 5th of January, 1862, the snow began to fall, and, with but one slight break in February, continued to fall heavily at intervals, lying on the ground until towards the middle of March. This severity was, however, followed by a summer and autumn of almost unexampled beauty, the fine weather, the "Indian summer," extending into the middle of December.

In ordinary seasons the Isothermal line of Vancouver Island would pass through the southern counties of England. Taking the average annual maximum temperature at London in June as

86°, the minimum as 22° Fahr. in January, the range will be 64°. In Vancouver, as shown by the abstract above given, the maximum temperature for the year was 84° in June, the minimum 14½°, which would give a range of 69½° Fahr. But this fall to 14½° for a day or two in December must be looked on as exceptional, and the usual minimum standard of 22° Fahr. accepted; this gives a range of 62° Fahr., almost the same as that of London.

The register kept on shore has been taken in preference to one kept on board, in making the above comparison, the conditions being more equal; for it must be borne in mind that, strictly speaking, there are two well-marked climates in Vancouver, viz., a littoral and an inland climate: the former, due to the causes already mentioned, cold arctic currents, &c. &c., has a lower range, as shown by registers kept on board ship.

The whole area of Vancouver Island comprises about twelve million acres, the greater proportion of which is mountain and barren rock. There may be in all, if the land were cleared, one million acres available for the agriculturist and stock-breeder. The country is divided into districts, some of which are as yet unsurveyed.

The following, beginning at the south-eastern end of the island, are surveyed:—Sooke, Metchosin, Esquimalt, Victoria, Lake, North and South Saanich, Cowitchin, Comiaken, Quamichen, Shawnigan, Somenos, Sallas Island, Nanaimo, Cedar, Mountain, and Cranberry.

The unsurveyed districts are:—Highland, Chemainus, Salt Spring, Barclay Sound, Nootka Sound, Fort Rupert, Comux, small islands and dependencies, San Juan, Oyster Bay, James Island, and Koskemo.

Following these districts as herein set down, it will be interesting briefly to set forth their special characteristics and capabilities.

Of those surveyed, beginning at the south-eastern extremity of the island, Sooke will first claim our attention, and it will be found to possess some features of considerable importance. Situated advantageously and conveniently on the straits of Juan de Fuca, but for difficulties connected with the approach from seaward to its magnificent inner harbour, this district must have long ago assumed a position commercially of high importance. There is reason to believe that these difficulties may in time be overcome, and by the aid of steam-tugs vessels may be safely anchored in a harbour safe and landlocked. The formation, geologically, is an axis of trappean rock, having, resting on its north-western flank, clay-slates and micaceous schists; on its southern and south-eastern, a sedimentary deposit of stratified sandstones, shales, and seams of coal. The agricultural resources are limited. Such open land as exists is of excellent quality, bearing very heavy crops, and a considerable quantity will become available for farming purposes, as the land is cleared of the heavy and very valuable timber that now covers it.

The highest elevation is about 1500 feet. All over the surrounding broken country there is excellent grazing, during seven months of the year, the wild vetch growing luxuriantly to a height of three or four feet. On Sooke River there are many fine, though limited valleys, all bearing magnificent timber, cedar especially. One of these valleys is computed by the surveyor to contain 2000 acres. The whole district contains 10,201 acres.

The carboniferous deposit has been proved by "bore" to the depth of 84 feet, and two thin seams of coal have been passed through. A promising vein of copper has been found, and is now being worked.

Metchosin District contains 11,897 acres. There is some fine grazing-land, but little prairie, heavy timber covering the whole. The pines are very fine, but far back from the sea. The whole district is very beautiful and salubrious, well sheltered, with a dry gravelly soil, adorned with Druid-like groves of oak and solemn-looking clumps of pine, intermingled with the varied foliage of a thick shrubby undergrowth.

Esquimalt District contains 12,426 acres. The soil, generally, is poor in quality, covered with scrubby timber, a great deal of rock, and many lakes and large swamps. The great importance of this district consists in its excellent harbour. This is a safe and excellent anchorage for ships of any size, and with the aid of the light on Fisgard Island may be entered at any time with great facility. The holding-ground is good,—a tenacious blue clay. The extent of this fine harbour is about three miles by two, with an average depth throughout of from 6 to 8 fathoms. Great natural advantages and facilities exist for the extension of townships and the formation of docks, and there can be little doubt but that here will be established the head-quarters of the royal naval force in the Pacific. Amongst other projects connected with the development of the colony, is that of a railroad to connect this with the neighbouring district and town of Victoria.

The village or hamlet of Esquimalt consists of a few scattered houses, chiefly hotels, dependent for support on the mail-steamers and ships of the royal navy there stationed.

Victoria District contains 16,679 acres. Clay subsoils characterise this district, over which is spread a coating of vegetable mould—humus. The lands reclaimed from the swamps are very rich and fertile. The whole surface is undulating: in most places thickly timbered, in the neighbourhood of Victoria clear, and sweeping along the coast-line as fertile grassy pastures. Traps, clay-slates, and limestones enter into the geological formation of this as well as of Esquimalt District.

The Harbour of Victoria has been thus described by Captain Richards:—"Victoria Harbour is a little more than 2 miles eastward of Esquimalt, with its entrance between McLauchlin and Ogden Points. The entrance is shoaly, narrow, and intricate; and with south-west or south-east gales a heavy rolling swell sets on the coast, which renders the anchorage unsafe outside; while vessels of burden cannot run in for shelter unless at or very near high water. Vessels drawing 14 or 15 feet of water may, under ordinary circumstances, enter at such times of tide; and ships drawing 17 feet have entered, though only at the top of spring-tides.

"The channel is buoyed, and every means has been taken to make the entrance as safe as possible, and doubtless the harbour is susceptible of improvement by artificial means."

Originally selected by the Honourable Hudson Bay Company as the depôt of their establishments, in consequence of the quantity of good clear land in the neighbourhood, and the harbour being sufficiently spacious for the few small vessels in their employ, it was, as a site in these respects, admirably chosen; but it has been a fatal mistake, at a later date, not to have adopted Esquimålt as the commercial port. The inlet of the sea which forms the harbour of Victoria runs northerly for some miles, with an average breadth of a few hundred yards, and at one point is separated by but a narrow neck of land from Esquimalt Harbour. Through this it has been proposed to cut a canal and thus connect the two harbours.

The town of Victoria, situated on the eastern side of the harbour already described, has sprung into existence during the last six or seven years. Originally the site, as already mentioned, of a trading establishment or fort belonging to the Honourable Hudson Bay Company, it may, under the influence of the neighbouring gold regions and the great natural advantages of its position, become a place of great importance, not only to British colonists but to those also in American territory along the whole seaboard of the North Pacific.

Adjoining Victoria is the Lake District, containing 14,048 acres. The land is of the same character as that of Victoria. Numerous fine lakes give a name to the district.

The districts of North and South Saanich contain respectively 10,767 and 12,216 acres. These districts contain some of the best agricultural land in Vancouver. There are indications of copper, and a coal-seam of inferior quality crops out on the eastern coast. The land not taken up or pre-empted is worthless; some of it may be useful for grazing.

Following the coast-line north and west, we come to the fertile valley of Cowitchin, with the adjoining districts of Comiaken, Quamichen, Shawnigan, Sominos, and Chemainus. These, with the exception of the last, as yet unsurveyed, give an aggregate of 54,836 acres. These important districts afford a good type of the lands fitted for agricultural purposes and require a special notice, seeing that they give the general characteristics of the fertile valleys that fringe the eastern coast.

The Cowitchin valley, about 15 miles wide, upon the sea-coast, narrows rapidly in a westerly direction to the width of about six. Bounded by high ranges of mountains composed of calcareous rocks these ranges form almost impassable barriers to the valley north and south. To the disintegration and the decomposition of these rocks, all highly charged with the carbonate of lime, is due the distinctive character of the soils throughout Cowitchin Valley. In their nature they are essentially calcareous; for while the other constituents occur in different degrees in this locality, carbonate of lime almost invariably predominates; and of this soil there is usually a good depth of from 2 to 3 feet, resting on a sufficiently retentive subsoil of blue clay or gravel.

The earths, chiefly light, very porous, and composed of due proportions of clay, sand, carbonate of lime, and humus, are well constituted for absorbing and retaining moisture; and the general colour, from brown to black, with the entire absence of chalky or white earths, would likewise indicate a favourable soil for receiving and retaining heat. Samples taken from the Sominos plains were found by experiment to absorb water sufficient to increase the volume of soil from one-eighth to one-fifth of its whole bulk.

Much of the soil along the Cowitchin River is a clay loam of a brown colour, and is an excellent soil for wheat, beans, turnips, and red clover. The soils on the more open lands are either gravelly, or sandy and gravelly loams, eligible for barley, oats, rye, buckwheat, beans, peas, the root and leaf crops, potatoes, turnips, carrots, and the usual garden vegetables.

The loamy soils, everywhere possessing a depth of 2 or 3 feet and containing a large proportion of the calcareous principle, are especially eligible for fruit culture. Apples, pears, cherries, and, indeed, all our hardy garden fruits, might be grown to perfection. It is believed that the filbert and hardy grape-vine could be easily and successfully cultivated; and among the native fruits the blackberry, mulberry, raspberry, strawberry, gooseberry, currant, and high bush-cranberry would require but little pains and culture to produce luxuriantly. The strawberry grows wild on the prairie lands, nearly of the same size as the garden-fruit.

The species and varieties of plants growing in these districts are very numerous. On the meadow-lands are the following: white pea, wild bean, ground-nut, a species of white clover, reed meadow-grass, bent spear-grass, wild oat, wild Timothy, sweet grass, cowslip, crowfoot, winter cress, partridge-berry, wild sunflower, marigold, wild lettuce, nettles, wild angelica, wild lily, brown-leaved rush.

The forest growth consists of oak, various species of pine, red or swamp maple, elder, trailing arbutus, crab-apple, hazel, red elder, willow, balsam, poplar, cedar, barberry, wild red cherry, blackberry, yellow plum, chokecherry; black, red, and white raspberry; prickly purple raspberry, prickly gooseberry, swamp gooseberry, several kinds of currants, bearberries, mooseberry, snowberry, bilberry, cranberry, red and white mulberry.

The geological formation is very important, containing as it does valuable building material, as sandstones and limestones, trap rocks, and metalliferous slates.

The region abounds in lakes and good-sized streams, several good falls existing at various points sufficient to meet the wants of a large population, as regards both grist and saw mills.

Sallas Island contains 3448 acres.

The district of Nanaimo has a very important geographical position, and possesses a very interesting, and economically valuable, geological history. Its whole area, comprising 48,375 acres, is subdivided into the Mountain, Cranberry, Cedar, and Delta of Nanaimo, Districts, each so named from its respective special characteristic. The general character of the whole is mountainous, the soil poor and sandy. Good land, available for agricultural purposes, is to be found, however, on the alluvial flats forming the delta of the Nanaimo River, and in the lacustrine deposits of the swampy hollows which mark the site of a chain of lakes stretching westerly inland along the Millstream River.

The working of the valuable coal-field of Nanaimo has been carried on very irregularly; and only of late have any steps been taken on a scale commensurate with its importance. The value of the new seam now being worked has been fully recognised, and the demand increases rapidly.

Rising behind the settlement of Nanaimo, is Mount Benson, a trappean mass, which, attaining the height of 4000 feet, sends, in a curvilinear form, spurs running north-east and south-west, describing the segment of a circle. Resting on these spurs, dipping south-east and easterly, are the upturned edges of these sedimentary rocks, the whole much disturbed, not only by numerous faults, but by twistings laterally, heaves and slips of strata.

On the Chase River, which flows along the south-eastern spur, there are three outcrops of coal, 3 feet 10 inches, 5 feet, and 2 feet

6 inches respectively. The first or Douglas seam, now being worked, furnishes the best coal as yet taken out, and is reported as most favourable, both by analytic chemists and practical men.* The present working is in a proved area of 600,000 square yards. A shaft, 60 fathoms deep, reaches the coal, which yields 1 ton to the square yard, increasing in the dip, so that, at a fair computation, 800,000 to 1,000,000 tons of coal may be calculated on from this seam alone. If the other underlying 5 feet and 2 feet 6 inches seams can be conveniently reached and worked, it may be fairly assumed that in this one block 3,000,000 tons of coal are available.

The Douglas Seam was first opened in August, 1852; and the work was continued at various points, by the Honourable Hudson Bay Company, up to the end of 1862. During that period, working very irregularly, they took out 63,154 tons of coal, which, at an average of 8 dollars per ton, gives a total value of 101,046*l.* The price is now reduced to 6 dollars at the pit's mouth; but a much greater quantity is raised, and extensive explorations, to develop still further the value of the property they hold, are now being made by the Vancouver Island Coal Company. In the very first year of their operations they have raised 22,000 tons, the demand increasing rapidly in the San Francisco market. Vessels of large tonnage (one of 1500 tons) now frequent the port, where formerly, with the exception of these ships, schooners of small tonnage were the largest craft.

The remarkable progress already made in the colonies of British Columbia and Vancouver Island—a progress achieved under very great difficulties, and with much discouragement—shows, in some degree, of what these countries are capable. Their great importance, politically, is acknowledged by statesmen; their capabilities, commercially, are proved by merchants and bankers.

The important step must soon be taken, of connecting, by railway, these colonies with the Canadas, and thence, by ocean steamship, with the mother country. The exit of this route from the American Continent must be at some point immediately opposite to Nanaimo. When Nanaimo shall be a port of entry, as soon it must be, there will be established an ocean terminus. Across the ridge, behind Nanaimo, a trail of about 13 miles, leads to the head of the Alberni Canal on the west coast, whence,

* The excellent quality of this coal is now indisputable. It yields a hard, lustrous, fissured, and little swollen coke. It contains little hydroscopic moisture, and burns well, with a steady heat and a brilliant flame—spec. grav. 1·317. Its steaming properties have been very favourably reported on by the engineers of H. M. ships and other vessels on the coast. In stowage, Welsh coal has the advantage over it of about 12 per cent.; Newcastle (English) 2 per cent.; but with most north country coal, and all Scotch, the advantage would be in favour of the Nanaimo coal (Douglas seam) by 2 per cent.

at all times, steam-vessels may have free access to the North Pacific.

Nanaimo settlement is prettily situated. The site of a town is now being laid out; the soil, a sandy loam, is dry and healthy, being suitable for gardens and orchards.

The Valley of the Comux, another fine agricultural district, as yet unsurveyed, lies north of Nanaimo. Its special characteristic is the existence of successive terraces of open prairie-like land, marking separate periods of slow upheaval. But, partially explored, no further special account of its capabilities can be given than that, in its general character, it closely resembles the Cowitchin Valley, the districts and delta of which have been already fully described.

Proceeding north and west, passing Valdes Island, and through Johnstone Straits, an excellent route for steamers, abounding in good anchorages, the extreme north-west point of the island is reached, where Fort Rupert, a trading station of the Hudson Bay Company, is established. Here the carboniferous formation is again met with; but there have been fewer disturbances than at Nanaimo; the strata lie almost horizontally. The land is unsurveyed.

The western coast of the island, commencing at Cape Scott, possesses a great number of remarkable and interesting features. From this cape a group of islands extends westerly for 40 miles; it is composed of three large and several smaller ones, which are high, conical and bare. They are called the Nine-pin Rocks. Triangle Island, the westernmost of the group, is a very remarkable island, 1000 feet in height, having a curious notch on the summit. Between the Cape and the nearest islands there is a good clear passage of 2 or 3 miles wide.

Immediately south of Cape Scott is Quatsino, an important inlet, stretching across the island nearly to Fort Rupert, on the eastern side. Coal has been found, and a Company formed for working it. This, with other resources, copper and fine timber, and so forth, will make this a place of importance.

Woody Point separates Quatsino from Kyuquot, a district which extends to Nootka Sound. This latter is a deep inlet, possessing few harbours or good anchorages. The small harbour or cove at its entrance is famous as the scene of the Spanish occupation dispute, and an anchorage nearly opposite has a special interest as having been Cook's first.

Clayoquot Sound differs from all the other inlets of this coast; its entrance being full of banks and shoals of sand and gravel, instead of a deep muddy bottom. Here, also, is the gneisso-granitic axis of elevation already alluded to, having associated therewith micaceous, hornblendic, and coarse-framed quartzose rocks, intruded trappean dykes, and quartz veins, indicating a region most probably rich in mineral wealth.

Barclay Sound, situated close to the entrance of the Straits of Fuca, has a very important geographical position. A somewhat open sound, studded with numerous islands, it possesses several good anchorages, one within very convenient distance of the entrance of Cape Beale, on which a lighthouse will ultimately be erected. At the upper end of the sound a very remarkable cleft in the mountain-range, known as the Alberni Canal, leads, after a course of 25 miles, to a level country of considerable extent, heavily timbered, with the finest specimens of pine and other woods perhaps anywhere to be seen. Through this flows a stream, discharging the waters of a chain of lakes, which penetrates northerly into the interior. The anchorage is good, and the whole sound, canal, and harbour, can nowhere be excelled in the facilities they afford for the protection and defence of commerce. Its connexion with Nanaimo has been adverted to.

Such is the general character of Barclay Sound. Its political and commercial importance merit a more special detail. Passing through the Sound, leaving behind Ship Island, with its three big pine-trees, "Fore, Main, and Mizen masts," past the numerous bristling islets, the Alberni Canal is entered through the Devil's Gap, the rocky sides of which run so sheer down into the deep water that the largest ship could make fast alongside to the pine-trees, the shores, on either hand, not being more than a pistol-shot apart. The fleets of the Pacific might ride in the Sound, or, for the matter of room, inside the Devil's Gap. A more secure place for an arsenal than Alberni, if the Devil's Gap had one or two heavy guns mounted, could not be found on the Pacific Coast. Its convenience also for refitting ships is great; timber for masting or repairing purposes being plentiful. Plenty of fair farming land, and fresh water in abundance. Possibly, the fact that the money of the colony is chiefly invested at Victoria, decides the question at present in favour of Esquimalt as the head-quarters of the Royal Navy; but in case of a war in the Pacific, there can be little doubt but that Alberni and Barclay Sound, from the commanding position of the latter, at the mouth of the Straits of Fuca, will be found an invaluable base of operations for our navy in that part of the world.

The high and rocky sides of the Alberni Canal end on the right hand with a bold outstanding rock, known from its colour as Copper Mountain; and from it the canal opens into a wide oval-shaped basin, at the far end of which the buildings of the Alberni settlement are seen. The River Somass runs into this oval-shaped basin, and at the junction there are considerable flats of good meadow-land.

The Alberni settlement was founded in 1859-60, by the London firm of Anderson, Thomson, and Co., who had previously imported the Douglas pine into Europe, and had thus become acquainted with the resources of the colony in respect to its timber. Several good-sized schooners have been built at Alberni, and others are now building. Fish curing has been carried on to some extent; the abundance of salmon and cod in the neighbourhood making this a favourable place for such operations. A coasting trade is carried on by agents of the Company with the Indians for furs, oil, fish, and so forth.

Of San Juan it may be sufficient to say that its importance as a military post has been much exaggerated. There is, it is true, some fine arable and grazing land on this island, now famous in colonial history. Its position has been supposed to be such as to confer on that military power which should occupy it, the command of both the Fraser River and of Victoria Harbour. But this is a fallacy; it commands neither; more especially since the almost exclusive introduction of steam-vessels and the discovery of the Rosario Channel.

A great portion of the area of Vancouver's Island, which is neither sold, pre-empted, nor reserved (7,598,215 acres) is unavailable land, perhaps four-fifths of the whole being barren rock. Heavy and very valuable timber now covers many fine districts, which, as they become cleared, will become available for cultivation. The expense of clearing is at present great, from 6*l.* to 14*l.* per acre. The richer alluvial soils, bearing willow, poplar, and alder, are cheaply and readily cleared by fire. In the agricultural districts described, there is, however, enough for farming purposes on a small scale, into which the farmer can at once put his plough; the clearing of the timber from the land keeping pace with the wants of a farm, for outbuildings, and other purposes.

Farming operations are conducted on the same rotation four-course system as in England. The crops generally raised are wheat, barley, oats, and peas. The green crops are, turnips, mangel-wurzel, vetches, potatoes, and all kinds of vegetables. Nowhere does the potato flourish more or attain a better flavour.

The average production of wheat is 25 to 30 bushels per acre, 64 lbs. to the bushel; of oats, 40 bushels per acre, weight 36 to 46 lbs.; potatoes, 200 bushels per acre. Barley, in proportion to the cultivation of the land, from 24 up to 40 bushels per acre. Fruit culture has proved a valuable and paying branch of industry.

The experiment of the free port of Victoria has been most successful in establishing and developing commercial prosperity: suitable to the first conditions, it may be doubted, however, if it can always be maintained. The revenue from the want of customs is small, about 25,000*l.* annually; and taxation presses heavily on one portion of the community alone; for the native population, numbering about 18,000, pay no taxes whatever, and in some imported articles are large purchasers and consumers. A capitation tax, levied by the chiefs, must one day be laid on to relieve, in some degree, the colonists, who now pay all; or Customs duties must be exacted.

The salubrity of the climate is indisputable. It is a climate that a man can be out-of-doors in every day of the year. There are no epidemic diseases. Infantile epidemics have been introduced, and lately smallpox has committed great ravages amongst the natives. Under the influence of intemperance and other vices, the native population is gradually disappearing.

The sportsman in Vancouver will find abundant use for both rod and gun; and, as a hunter, he may distinguish himself in the forest; the puma, the bear, and the wolf being worthy of his prowess. There are two kinds of grouse, and snipe and wild fowl in great variety and number. Two kinds of deer are found, the larger, popularly known as the elk, reaching the weight and size of an ordinary bullock. Salmon abound, but will not rise to the fly; splendid trout-fishing may, however, be had in every stream and lake.

Such, briefly sketched, are some of the capabilities and resources of the colony of Vancouver Island. It is evident that her geographical position gives her commercially, and, in a military point of view, strategically, the command of the North Pacific.

Her bold and rugged shores have few hidden dangers; and the seaman, knowing that he has safe and sure guides, can, in the darkest night, as in the open day, run for his port. Carrying on a trade with Australia, Vancouver has already established relations with three gold-producing countries. Her importance will soon be felt on the distant shores of Russian Asia, Japan, and in the China Seas; and, when the wealth of the Pacific Islands comes to be developed, the free ports of Vancouver will be emporiums of their trade for the supply of North-West America.

In her soils, Vancouver, as has been fully shown, possesses all the qualifications necessary for raising food for man and beast; and these soils are by no means so limited in extent or inferior in quality, as to preclude the possibility of the island being a grain-producing colony. The mineral resources of Vancouver may be summed up as coal, copper, and possibly silver and gold. The latter is widely spread over the country in the drift clays and gravels; and of late, auriferous quartz has been found in the neighbourhood of Victoria, leading to a great pre-emption and occupation of land.

The following will give some idea of the resources of Vancouver Island in woods of economic value. The list is according to popular names. White fir, spruce fir, balsam fir, white pine, yellow pine, cedar, vine-leaved maple, broad-leaved maple, alder, willow, poplar, yew, logwood, cotton-wood, crab-apple, service-tree, hemlock, oak, arbutus, yellow cypress, &c. Of all these, the white fir or Douglas pine (*Abies Douglasii*), is the most important; it grows to an enormous size, and is one of the best woods for spars known. This is *the* tree of the colony, and it is the commonest on the north-west coast. A specimen, by no means a large one, may be seen erected as a flagstaff at Kew Gardens. In some instances this tree has been known "*to square*" 45 inches for 90 feet. The cedars are very fine, with an average diameter of 6 to 7 feet. One has been measured of 14 feet. They are found in great abundance both at Sooke and Nanaimo. The details given in the description of the Alberni Settlement show how these products are utilised, and how valuable they are commercially.

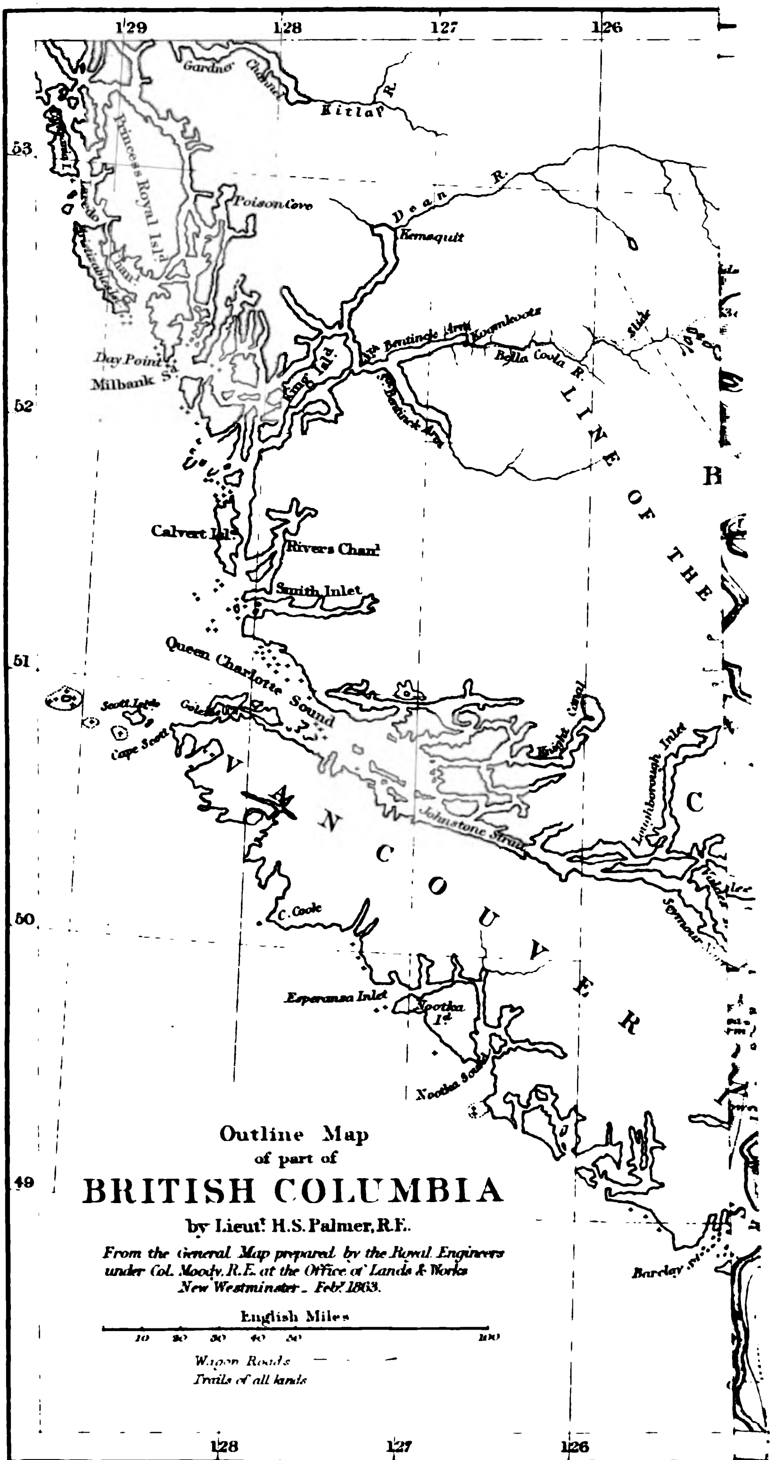
The Fisheries will one day prove a source of great wealth to the colony. Extensive banks lie off the south-western extremity of the island, these lying between the parallels of 48° and 49 have their seaward boundaries 32 miles off shore.

This, the outer edge of the bank, is rather steep, falling from 90 to 150 fathoms, and then no bottom with an ordinary line. Other banks exist in Puget Sound and in the Strait of Georgia, off Borrardy Inlet. All of them are well stocked with fish, especially cod, the true *gadus*, an excellent fish of its family, small but very good. In the neighbouring streams and lakes, and surrounding seas, are salmon (five species), trout (many species), herring, haddock, smelt, halibut, sturgeon, whiting, several species of rock fish, and sea perch, eulachon, &c.

A company is being formed to prosecute this branch of industry, and with every prospect of success, an extensive market existing along the whole North and South Pacific coasts. The attempt has been made before, but failed through injudicious selection of fish. In the case of the salmon, there are only two species that are really good; the others are coarse and oily, and having been cured and mixed with the better kinds, have given the whole a bad name.

Let it be borne in mind that such advantages as the colony possesses are *prospective*. Politically, these colonies are of the first importance as a military outpost, they are absolutely necessary for our commerce and supremacy in the Pacific. Dockyards must be established to refit and repair the ships that protect that commerce and maintain that supremacy. At present, for such repairs, recourse must be had to a foreign port.

The difficulties and drawbacks of the colony are the price and expense attending the voyage thither, and the want of direct postal communication. At present all letters pass though the hands of the officials of the United States post-offices.



Gardner Channel
Kitlat R.
Princess Royal Isl.
Poison Cove
Dean R.
Kemsquit
N. Bentinck Arm
Bella Coola R.
LINE OF THE
Day Point
Milbank S.
King Isl.
S. Bentinck Arm
Calvert Isl.
Rivers Chan.
Smith Inlet
Queen Charlotte Sound
Scott Isles
Cape Scott
Knight Canal
Loughborough Inlet
Johnstone Strait
V A N C O U V E R
B
C
C. Cook
Esperanza Inlet
Nootka Id.
Nootka Sd.
Barclay
Outline Map
of part of
BRITISH COLUMBIA
by Lieut. H.S. Palmer, R.E.
From the General Map prepared by the Royal Engineers under Col. Moody, R.E. at the Office of Lands & Works New Westminster _ Feby. 1863.
English Miles
10 20 30 40 50 100
Wagon Roads
Trails of all kinds
129 128 127 126
53 52 51 50 49

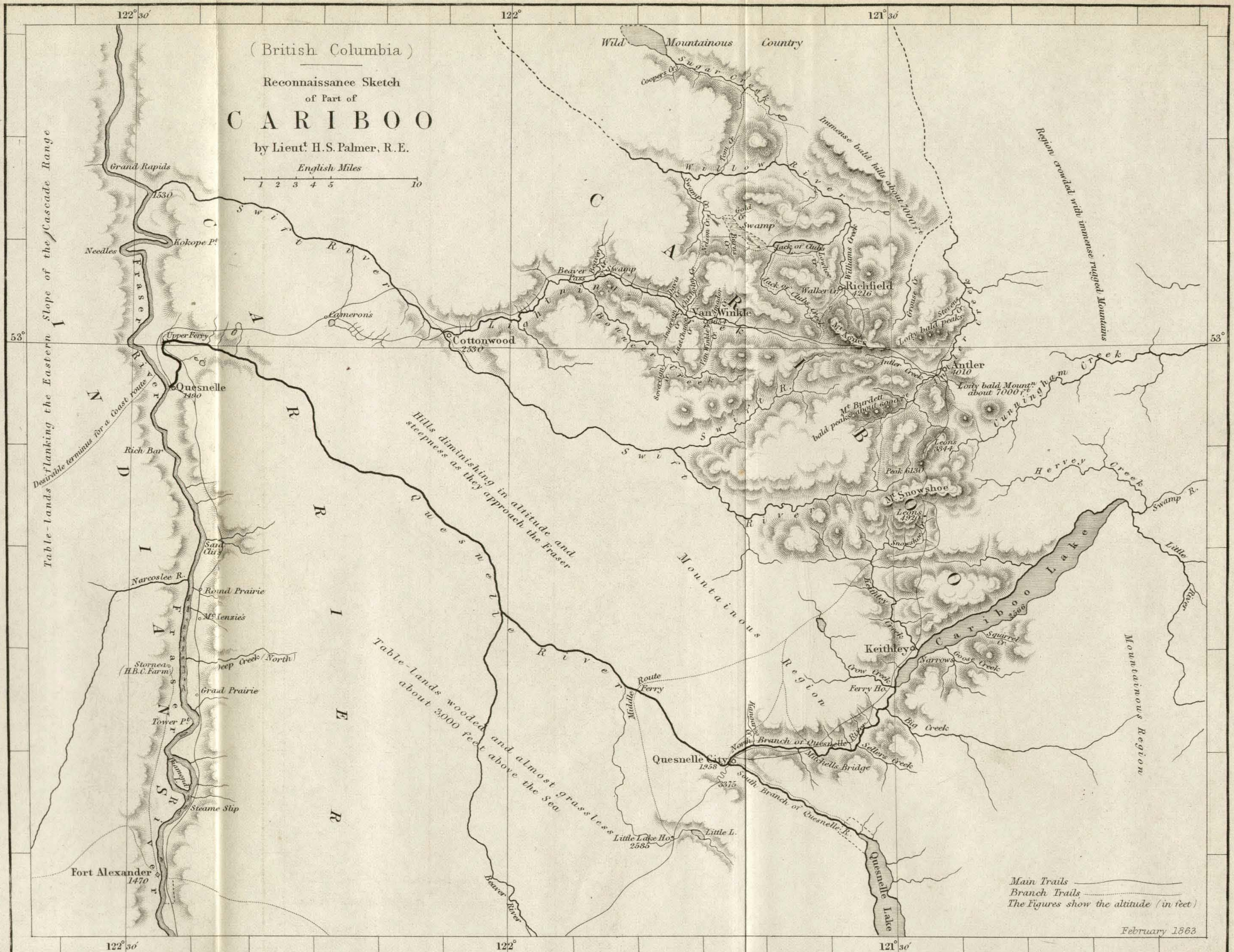
For a long time the expense of the short sea-voyage, *viâ* Panama, and the length of the long sea-voyage, *viâ* Cape Horn, will prevent the population really wanted in the country finding its way there from England. As an inducement, free grants of land ought to be given. The probability is that the class of small farmers required will be supplied from amongst the hardy settlers of Canada. These men are eminently qualified for developing and making the most of the resources of both British Columbia and Vancouver Island.

The present population of Victoria and of Vancouver Island generally numbers probably 6000; but there is, besides, a large floating population consisting chiefly of miners.

X.—*Remarks upon the Geography and Natural Capabilities of British Columbia, and the Condition of its principal Gold-Fields.* By Lieutenant H. S. PALMER, R.E.

Read, March 14, 1864.

THE discovery of gold in the extreme west of British North America, in the year 1858, was destined to prove an event of more than passing importance in the history of modern colonial progress. Upwards of 200,000 square miles of savage territory were at once erected into the colony of British Columbia, and the new region became hastily peopled by hordes of eager gold-seekers from the neighbouring states. The shallow "bars" of the Fraser and Thompson Rivers soon ceased to be profitable; but step by step, with varying success, yet unabating vigour, the alluvial gold was traced upwards to its parent sources in the hills, and, in 1861, three years of patient toil were rewarded by the discovery of the now famous gold-fields of Cariboo. The productiveness of these new mines has, during the last two years, been so great as to place them in the first rank of modern gold discoveries; and, indeed, a comparison of their returns with those of the most notorious districts in California and Australia encourages the belief that the auriferous riches of Cariboo are the greatest hitherto discovered. While the gold-miner's incursions have been thus rapid and extensive, civilization and enterprise have not been far behind him, and the young colony now attracts attention by its various commercial and agricultural, as well as its mineral, advantages. During the last five years, the writer has had frequent opportunities of travelling somewhat extensively in British Columbia, and the object of this communication is to describe, with as much detail as a short paper will admit of, its physical geography and natural capabilities, and the condition of its principal gold-fields.



Published for the Journal of the Royal Geographical Society, by J. Murray, Albemarle Street, London 1864.

The seaboard of British Columbia, commencing at the international boundary-line (lat. 49° N.), extends for some 500 miles in a general northwesterly direction. Foremost among its peculiarities is the extraordinary length of shore-line, bearing, indeed, an enormous proportion to the actual span of the coast, and due to the existence of a continuous series of long arms of the sea, which everywhere pierce the coast; and, in some instances, penetrate inland to distances of 80 and even 100 miles. Numberless archipelagos of rocky islets stud the whole seaboard, and, bordering closely upon the mainland, furnish protection to its shores; and, further still to seaward, Vancouver and Queen Charlotte Islands, separated only by narrow straits from the continent, form huge natural breakwaters which shield it from the full force of the Pacific. Thus, the entire seaboard, with its inlets and numerous outlying islands, presents an extraordinary network of sheltered water-communication, so continuous, indeed, that the experienced navigator, familiar with its intricacies and perplexing tidal irregularities, may work his way along shore from end to end of the coast, and rarely, if ever, be forced to seek the open sea. The inlets are everywhere deep and narrow, and, although subject to strong winds and tides, and by no means abounding in anchorages, they present scarcely any material obstacles to navigation by steam-vessels of the largest class. Piles of giant mountains rise everywhere abruptly from their shores, and snowy peaks and glaciers, pine-clad slopes, rugged cliffs and precipices, gloomy valleys and picturesque waterfalls, combine in endless succession to form an aggregate of sublime and wild, though desolate and unattractive, scenery.

According to the most recent Parliamentary enactments, the colony of British Columbia, apart from its numerous island dependencies, comprises all the territories stretching from the 49th to the 60th parallel of latitude, and from the culminating ridge of the Rocky Mountains to the shores of the Pacific, a small strip of Russian territory along the extreme northern seaboard alone excepted; and beyond the parallel 56° N., that portion of the soil to the east of the Rocky Mountains, extending as far as the 121st meridian, is further included within the bounds of the colony. But, of the immense area thus circumscribed, all that portion lying to the north of the 54th parallel remains, and is likely to remain, an uninhabited wilderness. Little only is known of these extensive solitudes. Indeed, the officers and servants of the Hudson Bay Company, who dwell at fur-trading posts widely scattered throughout the district, and are, with the exception of scanty native tribes, its sole inhabitants, are the only white people possessing any personal acquaintance whatever with its geography and natural capabilities. From them we learn that, although not entirely devoid of attractive features and occasional patches of good soil, this portion of the colony is on the whole cheerless and uninviting, and especially ill-adapted for occupation by man. Moreover, its high latitude and extreme elevation, and the rigorous climatic influences to which it is subject, are elements little likely to encourage its speedy development; and, coupling with these drawbacks the circumstance that settlement is but slowly creeping northward from the southern bounds of the colony, it may fairly be inferred that the region north of the 54th parallel presents a very slight prospect of early occupation. On this account, and in the absence of fuller and more perfect information than is at present to be had, the whole country north of this line will be purposely omitted from consideration in the following remarks upon the interior.

Looking inland, then, from the sea, the southern and explored part of the colony is found to be naturally divided into three great zones or belts of nearly equal areas, differing in their physical features, as well as in soil, climate, and vegetation; and bounded by lines generally parallel in direction to the coast on the one hand and the great backbone of the continent on the other. The first great belt may be defined as extending northwesterly from the international boundary-line to the 54th parallel, and inland to a distance of 120 miles from the coast. The area comprised within these limits is almost wholly occupied by a continuation of the great Cascade Range of Oregon and Washington Territories. Indeed, the estuary of the Fraser in the extreme south, where the hills recede to a distance of 40 miles from the coast, is the only patch of any size that can fairly claim the character of lowland and level country. Elsewhere, the Cascade Range, with its countless spurs and outlying ridges, occupies the whole of this broad strip of territory, and forms a massive sea-wall of pine-clad mountains, descending, as has been described, almost perpendicularly to the very shores of the inlets. The principal crest of this chain attains to an elevation of from 5000 to 6000 feet above the sea, at a mean distance of 70 miles from the coast. It is faintly marked by peaks rising but little above the neighbouring ranges. The magnificent isolated peaks, which, to the south of the boundary-line, tower up to altitudes of 15,000 and even 20,000 feet, and serve to indicate distinctly the general bearing of the range, are wholly wanting in British territory. The western slope, open to mild winds and genial showers from the Pacific, is everywhere clothed with pine forests of remarkable grandeur, stretching from the valleys to almost the highest hill-tops, and concealing at the lower elevations a massive, impenetrable undergrowth of deciduous bushes. On the opposite slope the climate is drier, the forests are less dense, and the pines of smaller proportions; and, as we approach the eastern limits of the range, underwood becomes more rare, the general profile less rugged and abrupt, and the country begins to assume a more attractive aspect.

But it is to be feared that, throughout the coast-range, no portion of the soil holds out any hope of extensive agricultural improvement; with few exceptions, the rivers which drain the hill-system are short and impetuous, and, pouring down the western slopes, find their way through inconsiderable valleys to the coast, and discharge themselves at the heads of the inlets. Even the larger streams, which, rising in the interior, thread their way through the heart of the range, are confined in narrow, precipitous passes or "cañons," through which they rush at prodigious velocities on their passage to the sea. So that, dismissing from consideration the small fertile patches in the river-bottoms, which are so contracted and thickly-timbered as to be of little avail for purposes of cultivation, the whole of this great belt under discussion, the Fraser estuary alone excepted, can only be regarded —from its inaccessibility, and its mountainous and forest-bound character—as an inhospitable wilderness, practically unsuited to purposes of agricultural settlement. Its mineral resources, and the region is not wanting in indications of vast metalliferous wealth, have yet to be explored. But, although comparatively valueless at present to the white settler, and, in fact, almost altogether unoccupied by him, except in its southern extremity, this mountainous belt is not without its substantial attractions to the native Indian. Many varieties of furred animals haunt its vast forests, and are hunted and trapped in the winter months for the sake of their skins and their meat. Indeed, the furs taken in the northern part of the Cascade Range are of the most valuable kinds, and the hunter finds a profitable market for them at the various ports and trading stations along the coast. Besides these, countless varieties of fish and waterfowl frequent the rivers and highland lakes, and furnish the Indian with both summer and winter food; beaver, valuable also for the sake of their skins, abound at high altitudes in the swamps, and wholesome berries and wild fruits grow in great profusion in the valleys and river-bottoms.

Emerging from this cheerless tract of mountain and forest, the traveller enters the second or midland belt, stretching from the southern bounds of the colony to the 54th parallel, and inland to a mean distance of about 110 miles from the eastern limits of the Cascade Range, and comprising an area of at least 45,000 square miles. The region thus defined exhibits a marked contrast to the coast district in its scenery and physical aspect. It may be described in general terms as a lofty, undulating table-land, traversed by numerous low ranges of hills, which enclose broad, well-watered, and not unfertile valleys. A group of rivers in the extreme south flow across the border towards the Columbia, but the Fraser is the main artery which receives nearly all the streams that drain the central and northern portions. Besides the main stream, many of the largest of its tributaries, such as the Chilcotin, the Thompson, the West River, and the Quesnelle, flow in deep valleys and chasms, far below the general level of the table-lands. All these rivers are beset by a constant succession of rapids, shoals, and waterfalls, and are, therefore (with the single exception of the Fraser), wholly unnavigable; and they exhibit throughout their course river-scenery of the grandest description. But the brooks and smaller rivers, which traverse the more elevated portions of the plateau, are entirely different in character, winding sluggishly, at high altitudes, through comparatively level districts, and communicating fertility to the neighbouring soil. In common with the larger tributaries, they occasionally spread out into picturesque lakes, which are frequented by beaver and by many varieties of fish and waterfowl. They are marked by no rapid changes in level until the last few miles of their course, when, arriving at the valleys of the principal arteries, they break abruptly away from the highlands, and descend swiftly in narrow gorges by a succession of rapids and waterfalls.

The scenery of the whole midland belt, especially of that portion of it lying to the east of the 124th meridian, is exceedingly beautiful and picturesque. The highest uplands are all more or less thickly timbered, but the valleys present a delightful panorama of woodland and prairie, flanked by miles of rolling hills, swelling gently from the margins of the streams, and picturesquely dotted with yellow pines. The forests are almost entirely free from underwood, and, with the exception of a few worthless tracts, the whole face of the country—hill and dale, woodland and plain—is covered with an abundant growth of grass, possessing nutritive properties of a very high order. Hence, its value to the colony as a grazing district is of the greatest importance. Indeed, the "bunch-grass," so called from the circumstance of its growing in large bunches or tufts, is probably unrivalled as a natural pasture. Cattle and horses are found to thrive wonderfully on it, and to keep in excellent condition at all seasons; and, except when required to do work of an unusually hard nature, they need no other food. In the woods, and on the highest portions of the table-lands, this grass deteriorates in quality, attaining to its greatest perfection at the lower elevations, but the whole area is more or less available for grazing purposes. Thus the natural pastures of the midland belt may be estimated by hundreds, or even thousands, of square miles. Moreover, large portions of the soil possess properties very favourable to agricultnre, and, although influences of climate and altitude are somewhat discouraging, they are by no means formidable obstacles to the energetic settler. But the climate of this district, and the capabilities of its soil, will be more fully discussed hereafter. On the whole, the possession of this fertile belt is of considerable importance to British Columbia. From its salubrious climate, its varied agricultural and pastoral capabilities, and its proximity to the lucrative markets of the gold-fields, it promises to become a pleasant and profitable, if not a very extensive, field for settlement; and there can be no doubt that it holds out far greater inducements to the agricultural settler than the low woodlands of the Fraser estuary, where it is both costly and laborious to prepare the soil for tillage.

The third and last belt of territory, extending from the eastern limit of the table-lands to the watershed of the Rocky Mountains, needs no more than a very general description. Entering it from the west, the transition from level to hilly country is somewhat abrupt, and, advancing eastward, the general profile rises steadily, until it gains the level of the great backbone of the continent. In this tract, the features of the coast district are repeated, though even on a grander scale—and, as a remark generally accurate, it may be stated that, with slight interruptions, the entire area is covered with a sea of towering pine-clad mountains, enclosing gloomy valleys—that it contains a smaller amount of agricultural land than any other district in the colony, and is wholly uninhabited by white men, except at the mining district of Cariboo, in its northern extremity. Yet, although thus outwardly unattractive, this region claims importance as the depository of vast mineral wealth, and the birthplace of the great streams that distribute their auriferous treasures throughout the whole western area. To these phenomena, however, it will be necessary to refer in a future paragraph.

Of the rivers of British Columbia, the most important by far is the Fraser, which traverses the colony from north to south, and receives, on its passage, almost every other stream of importance. It takes its rise in the Leather Pass of the Rocky Mountains, and discharges by two principal mouths into the Gulf of Georgia, a few miles north of the international boundary; and, together with its tributaries, drains an area that may be roughly estimated at 90,000 square miles. From its source, the Fraser flows, an impetuous torrent, in a general north-westerly direction for 180 miles, reaching its extreme northern latitude at the parallel 54° 30′. Issuing near this point from one of the great valleys of the Rocky Mountains, it takes a bold sweep to the southward, and entering a more open region, soon assumes the proportions of a broad, navigable stream. Its course, however, is not entirely free from obstructions. Dangerous rapids, some of them wholly incapable of improvement, occur here and there, though fortunately the intermediate stretches of unbroken water are of considerable length; and it is at any rate interesting to know, in connexion with the subject of a future route across the continent by the Leather Pass, that no less than 200 miles of this upper portion of the Fraser can be made available for steam navigation at the seasons when the stream is free from ice, viz., from April to October inclusive. At Fort Alexander its average breadth is about 300 yards, the mean velocity of the current 5 miles an hour, and the extreme breadth of the valley, measured between the points where it breaks from the table-land on either side, is from 3 to 4 miles. And here, for the first time, is noticed the remarkable terraced formation of the river-banks, peculiar to nearly all the great watercourses of the central districts. This formation consists of a series of perfectly level terraces or "benches," rising in steps one above another to altitudes corresponding on either side of the streams, and is due, no doubt, to successive sudden degradations of the river-levels at remote periods, occasioned by the removal of large barriers of rock or other obstacles in the defiles further down the valleys.

Twenty miles below Fort Alexander the Fraser valley contracts in breadth, and the course of the stream, for 150 miles further south, lies in one of the deep, narrow chasms of the central table-lands. Here the river, already increased in volume by the accession of numerous large tributaries in the upper portion of its course, again becomes unnavigable, and its continually swelling waters, limited to a narrow channel, soon form a boiling torrent, increasing in velocity at every mile. At Lytton, the Fraser is joined by the Thompson, one of its largest affluents, and, entering the heart of the Cascade Range, rushes for 50 miles through a stupendous gateway, replete with all that is grand and terrible in mountain and river scenery. The valley gradually narrows in, until, at its intersection with the principal crest, it dwindles down to a mere cleft in the range. Here the features of the pass attain to their most gigantic proportions. The river itself seems a mere brook in comparison with the huge mountains which project upwards on either side to altitudes of 6000 and 7000 feet. Not unfrequently the slopes are almost wholly devoid of timber, and rise abruptly from the valley, massive, unbroken walls of granite and trap, standing in stupendous contrast to the forest scenery on the river-banks and islands. Here and there naked cliffs rise perpendicularly out of the water; elsewhere the slopes are covered with immense slides of disintegrated rock, and countless waterfalls, thundering down the crannies and crevices of the mountain sides, contribute to the wonders of the scene. At the ordinary stage of the river, the velocity of its current is from 12 to 15 miles an hour; but in summer, when its waters are swollen to twice their ordinary volume by the melting of the winter's snow, it rises, in this portion of the pass, to as much as 60 feet above its usual level, and, tearing down a rocky, narrow channel at the rate of 20 miles an hour, exhibits a terrific succession of rapids, falls, and whirlpools. At Yale the Fraser again becomes navigable, and 40 miles lower down emerges from the tangled network of hills, and sweeps in bold curves and with diminished velocity through the level lands of its estuary to the sea.

Unlike any of the other large rivers in British Columbia, the Fraser, throughout its entire course of 700 miles, nowhere expands into a lake. Its waters, therefore, arrive at the sea laden with sand and alluvium, and being there met by the cross-tides of the Gulf of Georgia, the particles hitherto borne along by the current are deposited outside the entrance proper of the river. Thus, a series of shoals have been formed at the mouth, extending 5 miles to seaward, and right and left to distances of 8 or 10 miles along the coast. Fortunately, however, the great volume and impetus of the stream ensure at least one navigable channel through these shoals, and, at present, vessels drawing as much as 20 feet of water can pass easily upwards to the capital, and even to some 20 miles beyond it.

New Westminster, the capital, stands on a commanding eminence on the right bank of the Fraser, 15 miles from the mouth. The population is small, seldom exceeding 500 whites, and the city itself has not advanced with the rapidity usual in new countries—a circumstance arising, in some measure, from the difficulty of clearing the site for building, and from the absence of considerable tracts of land in its immediate neighbourhood available for inexpensive tillage. Indeed, throughout the whole estuary of the Fraser—and more than anywhere, perhaps, in the neighbourhood of New Westminster—the forests attain to a greater luxuriance than in any other part of the colony. Foremost among the productions of the forest, in point of splendour and economic value, are the Douglas pine (*Abies Douglasii*), and the cedar (probably *juniperus occidentalis*). The former grows to the enormous height of 200 and even 300 feet, and possesses qualities that render it especially valuable as a timber both for planking and spars. The cedar, though not so lofty, possesses an immense girth, some of the finest trees measuring between 50 and 60 feet in circumference at a height of 4 or 5 feet above the ground. This wood is more especially valuable for roofing and other building purposes, for cabinet-work, and for all structures exposed to the continued action of water; and the natives turn its bark to profitable account in a hundred different ways. These, together with some half-dozen other valuable varieties of pine and fir, form the bulk of the larger and evergreen growth. There are also the alder, the dog-wood, and crab-apple, two varieties of maple, the cotton-wood (probably *Populus balsamifera*) of the marsh lands, and many other varieties of deciduous trees; and a dense array of wild-fruit and berry-bearing bushes, which form a luxuriant and impenetrable jungle. The forests thus composed are almost universal in the Fraser estuary, and extend, with but little variation in character, over the whole western slope of the Cascade Range. The only open tracts of land are those which are liable to periodical inundations at the seasons when the streams reach their highest levels, and the low marshy districts at the mouth of the Fraser, where the land is seen actually in process of formation.

But on crossing the mountains, and entering the central districts of the colony, the magnificent varieties of timber met with in the neighbourhood of the coast entirely disappear. Nevertheless, there is wood sufficient for all the requirements of the settler, and the symmetrical yellow pine (*Pinus ponderosa*), peculiar to this district, dots the grass-lands of the valleys and slopes, and forms a conspicuous and attractive feature in the landscape. In the interior mountainous belt the forests of the coast district are repeated, though on an inferior scale, a consequence, no doubt, of the increased elevation and the rigour of the climate; and the undergrowth is far less dense.

The whole of the inlets, bays, rivers, and lakes of British Columbia abound with varieties of delicious fish. The quantity of salmon that ascend the Fraser and other rivers on the coast every summer is almost incredible. The first enter the Fraser in March, and are followed in rapid succession by other varieties, which continue to arrive until the approach of winter; but the great run occurs in July, August, and September. During these months, so abundant is the supply, that it may be asserted without exaggeration that some of the shallower streams can hardly be forded without stepping upon them. Apparently propelled by an undying desire to deposit their spawn at the head-waters of the various streams, vast shoals of these fish force their way annually to distances of 500 and 600 miles into the interior. Thousands perish from fatigue during this laborious ascent, and, on the subsidence of the waters, are left dead and decaying on the margins of the streams. On their way through the country they supply food for thousands of the natives, who, in fact, depend upon them in a great measure for their very existence, and at the time of the great runs, repair by whole tribes to the favourite fishing-grounds. The salmon are caught in a variety of ways. In the small rivers on the coast a dam is built, stretching from shore to shore, and rising high enough to create a considerable waterfall. On the top of the dam, and half immersed in the water, is placed a rude but ingeniously constructed weir, which entangles the fish as they jump the falls. At the mouths of the large rivers, where the currents are slight and the banks low, spearing from canoes is resorted to, and seine-fishing has been recently introduced by the whites. But in the cañons of the Fraser, and these are by far the most lucrative fishing-grounds in the whole colony, rude stages are built out from the cliffs, on which the natives stand with large scoop-nets, and thus bale the salmon out by hundreds, as they steal upwards in the eddies along shore. Occasionally, however—once perhaps in every 4 or 5 years—the supply almost fails; and although, by a wise dispensation, the natural fruits of the country are at such seasons proportionally more abundant, the natives nevertheless suffer fearfully from the dearth of their staple food.

Sturgeon, of as much as 500 lbs. in weight, abound in the lower part of the Fraser. As these fish usually lie at the bottom of the river, the Indian allows his canoe to drop quietly along with the current, and holds perpendicularly in his hand a long pole armed with a barbed trident fitted loosely on the lower end. The points of this trident are kept a few inches above the bottom. The moment the native feels a sturgeon, he strikes—the trident slips off the end of the pole, but, as it is further attached by a long running line to the canoe, the fish is eventually secured. The sturgeon are not confined to the Fraser; and instances are known of their having been caught in some of the far inland lakes. In the interior the brooks and highland lakes swarm with perch and several kinds of trout. Myriads of herrings frequent the bays and inlets on the coast, together with cod, flounders, hallibut, &c., and many varieties of cetaceous and shell-fish.

But, while the waters of British Columbia thus teem with life, its soil, on the contrary, is by no means so thickly inhabited. It is generally believed here in England that its vast forests are overrun by numberless wild animals, and afford magnificent hunting-grounds for the sportsman. This belief, however, is almost wholly erroneous; and the comparative absence of all but insect life in the forest is one of the first peculiarities that attracts the stranger's attention. Some twenty or five-and-twenty varieties make up the catalogue of the animal kingdom; and the individuals of each species are far from numerous in proportion to the enormous area they inhabit. Small, furred quadrupeds predominate, many of them being of the most valuable kinds, such as the marten and the silver-fox. Besides these, there are brown and grizzly bears, the elk, the black-tailed deer and reindeer, mountain sheep and goats, panthers, and some few other varieties. Birds are not much more numerous. Of these, which probably number one hundred varieties in all, water-fowl and birds of prey are by far the most abundant, though several descriptions of grouse frequent both the woods and plains. But, from the lack of food suitable for their support, birds of song are almost wholly wanting —a circumstance which, coupled with the scarcity of gay flora, materially heightens the natural gloom of the forests. Reptiles are still more rare. A few rattlesnakes are met with in the arid portions of the central belt, and several kinds of harmless snakes in the forests, and bull-frogs abound in the swamps; but the whole colony is utterly destitute of worms.

Travellers in British Columbia in the summer months will, however, all bear testimony to the abundance of insect life with which the air then teems. Foremost in numbers and powers of annoyance are the mosquitoes, which, on the subsidence of the rivers after the early summer floods, rise like a vast army from the earth, and invade almost every district in the colony. In the months of July and August these insects can only be described as forming a dense, humming, living cloud, which covers the country to a height of 20 feet above the ground. In the swamp-lands and along the margins of the watercourses, so multitudinous and venomous are they that horses and cattle have been known to die from the torment of their stings and the loss of blood. Although in open country the sun's heat and glare drive them by day to seek the nearest shelter, in the shade of the jungle they swarm both by night and day. Men and animals alike are thus fearfully harassed; and as the most fertile lands are generally also the most infested, the mosquito evil proves upon examination to be far more serious than at first sight appears. There are, moreover, other insect-pests, such as horse-flies, sand-flies, and a small, black, blood-sucking fly peculiar to high altitudes. House-flies are very plentiful, together with many brilliant varieties of butterflies, dragon-flies, and beetles.

The territories of British Columbia, extending over a wide range of latitude, and rising from the sea-level on the west to an altitude of 10,000 feet on the east, possess a correspondingly wide range of climate. They will be found, however, to present a marked contrast in their general thermal conditions to places in corresponding latitudes on the eastern side of the continent. This may be attributed, in the first place, to the absence of important Arctic currents on the Pacific coast, and the genial influences of the prevailing westerly winds—elements which serve to moderate the cold of winter; and, in the second place, to the neighbourhood of two great snow-covered ranges, which, although not without their chilling influence in winter, serve nevertheless to temper the summer heat. Thus, the mean annual range of temperature is far from excessive when circumstances of latitude and altitude are taken into consideration. The climate along the seaboard closely resembles that of many parts of Great Britain. The following Table shows the mean results of three years' meteorological observations at the Royal Engineer Camp, at New Westminster:—

MEAN RESULTS for the Years 1860-1-2.

Years 1860-1-2.	Rain.		Mean Temperature.		Humidity.		Mean Height of Barometer.	
	Number of Inches.	Number of Wet Days.	9·30 A.M.	3·30 P.M.	9·30 A.M.	3·30 P.M.	9·30 A.M.	3·30 P.M.
Means	54·124	150	48·5	52·5	·818	·797	29·956	29·924

Note.—The observatory is in lat. 49° 12′ N., being about that of St. Heliers, Jersey, or some 2½ degrees further north than Quebec. (Report by Captain R. M. Parsons, R.E.)

Of the 54 inches of rain here recorded as the mean annual fall, some 38 inches—an amount nearly corresponding with the mean fall for the whole year in the British Isles—fell on an average during the three first and three last months of the year. The mean temperature nearly corresponds with that of London; and the lowest temperature on the grass registered in the three years was — 15° Fahrenheit, on the 16th January 1862. But this degree of cold was an exception almost unparalleled in the memory of man; and was 25° Fahr. more intense than the greatest cold of either of the two previous years. During this severe frost, lakes in the interior, never before known to freeze, became covered with massive ice. The whole of the Fraser was frozen over, the ice at New Westminster attaining a thickness of 13 inches, and the river navigation remained closed for upwards of two months. Indeed, Yale, the head of steam navigation on the lower Fraser, was not accessible until a month later. This, however, is the only instance in the three years of an interruption of the navigation between New Westminster and the mouth of the river, though more or less floating ice of inconsiderable thickness usually encumbers the stream at some period or other during the winter.

To a short spring succeed four months of beautiful summer weather, usually terminating about the middle of September. During this delightful season little rain falls, and the days are generally bright and clear. Sea-breezes, blowing with great regularity from 11 A.M. until 5 P.M., temper the heat by day, the thermometer in the shade rarely rising above 80° in the hottest part of the summer; and by night, land-breezes blowing from the hills render the air deliciously cool and fresh. The break-up of settled weather is somewhat rapid; but in general the early frosts do not set in before the middle or latter end of October. About this time the heavy rains commence, the first snows soon appear on the hills, and thenceforward, until the middle of March, rain, fog, snow, and frost divide the days pretty equally between them.

The whole country to the west of the dividing ridge of the Cascade Mountains shares in the general humid and temperate characteristics of the climate of the Fraser estuary; but, on crossing the range, the eastern slope and the central belt beyond are found to exhibit some marked differences in their atmospheric conditions. Here but little rain falls, and some of the districts are exceedingly arid; indeed, in a narrow strip of territory lying immediately to the east of, and parallel to, the Cascade Range, the annual rainfall is incredibly small. And here again, notwithstanding the increased elevation, the seasons exhibit no remarkable extremes of temperature. The winters, though sharp enough for all the rivers and lakes to freeze, are calm and clear; so that the cold, even when most severe, is not keenly felt. Snow seldom exceeds 18 inches in depth; and in many of the valleys of moderate elevation even weakly cattle often range at large during the winter months, without requiring shelter or any food but the natural pastures. In spring and early summer the weather is more rainy and unsettled than at any other time of the year; but calm, cloudless skies prevail in July, August, and September; and although at this season the heat by day is somewhat greater here than on the coast—a circumstance arising in a great measure from the more open nature of the country—it is more than compensated by the extra coolness of the nights. Of the climate of the eastern belt very little is known, though the superior elevation and mountainous character of the whole region impart to it a greater rigour than is experienced in other parts of the colony. Yet even here the influences which serve to modify the temperature of the central and western districts seem to be not wanting; for all testimony concurs in assigning to the western slope of the Rocky Mountains a more temperate climate than is met with on the eastern side.

Judging from present experience, there can be no doubt that, in point of salubrity, the climate of British Columbia excels that of Great Britain, and is, indeed, one of the finest in the world. Moreover, it possesses elements peculiarly favourable to the European constitution,—an essential recommendation in the case of any British colony, but more especially of value when the wandering, open-air, and self-dependent habits of a gold-mining community are taken into consideration. There is an entire absence of pestilential localities, and in the pure, bracing mountain air men of even delicate frames soon acquire surprising vigour and healthiness of constitution. Thus the miners are enabled to face habitually, and without fear of detrimental effects, hardships and exposures under which, in less favourable climates, they would inevitably break down.

With the advantage of a magnificent climate, the rapid development of all the available resources of British Columbia may be with reason anticipated; and, as any but the most general remarks upon the qualities of the soil have been thus far omitted, it may not be uninteresting to conclude this hasty geographical sketch with a brief outline of the colony's agricultural and pastoral capabilities. With this object it will be necessary to return once more to the central belt, or rather to that portion of it lying to the east of the 124th meridian, which has been already spoken of as the most attractive district in the colony. Here, in sheltered and well-irrigated valleys, at altitudes of as much as 2500 feet above the sea, a few farming experiments have been already made, and the results have thus far been beyond measure encouraging. The soil, when well watered, is found to possess properties exceedingly favourable to the growth of nearly every variety of our English cereals and vegetables. At farms in the St. José and Beaver Valleys, situated nearly 2200 feet above the sea—and again, at Fort Alexander, at an altitude of 1450 feet—wheat has been found to produce nearly forty bushels to the acre, and other grain and vegetable crops to be abundant in like proportion. Again, at Pavillon, in the dry zone immediately to the east of the Cascade Range, the soil, aided by artificial irrigation, has proved to be prolific to a remarkable degree; the potato-crop having reached as high as 15 tons to the acre, and single turnips having been known to attain the enormous weight of 20 lbs. In Cut-off Valley also, on the shores of Okanagan Lake, and in many other favoured localities, equally astonishing results have been obtained.

The district, however, is not without its drawbacks. The farmer suffers occasionally from night-frosts extending far into the summer, from long droughts in the latter part of the season, and, still more often, from the difficulty and expense of irrigating the soil in the arid districts. Nevertheless, without going further into details, there is already abundant proof that many portions at least of this fertile belt are not wanting in most of the elements that conduce to successful agriculture. It will be remembered, too, that the experiments hitherto made are but first steps in husbandry, conducted under all the disadvantages of pioneering settlement at a few fertile spots in the immediate neighbourhood of the existing highways. And when it is further borne in mind that there are scores of valleys scattered up and down this region, now lying absolutely waste, which possess extensive tracts of suitable soil, the results of these early efforts furnish encouraging proof of what may be expected from an improved and more extensive system of agricultural settlement.

The pastoral capabilities of the central belt bid fair to be no less a source of future prosperity to British Columbia. Millions of cattle might graze over its luxuriant pastures, and exact but little tribute from the stock-farmer in the way of expenses for their maintenance. For, whatever precautions may hereafter prove to be indispensable in the more lofty portions of the grass-lands, experience thus far goes to prove—as has already been remarked—that at moderate elevations it is unnecessary to provide cattle either with shelter or additional food at any season of the year.

It may be asserted, then, without hesitation, that two-thirds, at least, of this eastern division of the central belt may, when occasion arises, be turned to good account either for purposes of grazing or tillage. Small though it may be—indeed, it is not more than one-fifth of the entire area treated of in this paper—this fertile tract is, nevertheless, of enormous value to British Columbia. This will be better understood when attention is drawn to the position of the Cariboo and other gold-mines, which are cut off from easy communication with the seaboard by a lofty range of mountains, and lie in the heart of a country lacking facilities for inexpensive transport. It then becomes evident that the possession of productive lands in the neighbourhood of the mines, capable of supplying them at moderate rates with the ordinary productions of the soil, is one of the first essentials to the proper development of the mineral wealth of the country. Moreover, it is obvious that, without productive lands, the colony can never hope to retain any but the most insignificant fraction of its auriferous treasures, and must for ever continue to be dependent upon other countries for its supplies. From its central position with reference to the mining districts, the fertile belt is well adapted for the supply of their markets; and, remembering that a country with but limited agricultural resources will feed a small and slowly-increasing population, such as that of British Columbia, it may fairly be anticipated that in the course of a few years every available portion of the soil will be brought by degrees under cultivation, and the whole region to the east of the Cascade Range be found to possess within itself ample resources for its own support.

We may search in vain throughout British Columbia for other inviting fields for agricultural settlement. The valley of the Lower Fraser, with its jungle and dense pine-forests, is but little likely to attract a large rural population for at least some time to come; though possibly enough land for the growth of supplies for the immediate neighbourhood may, ere long, be brought under cultivation; and the district is, at any rate, a limited one. Elsewhere, nearly all is mountain and forest and worthless land; so that, practically speaking, farming and stock-raising operations will, for the present, be almost wholly confined to the central districts. It would be unreasonable, therefore, to claim for British Columbia any comparison, in point of its agricultural and pastoral capabilities, with the more favoured possessions of our colonial empire—such as New Zealand, the Cape Colonies, and Australia—or the United States' territories, with their vast rich plains. Nor can it be pretended that the colony is likely ever to export grain, or to attract and retain a large population solely on account of its agricultural advantages. Yet there remains, at any rate, the gratifying assurance that, so long as gold continues to attract immigration, British Columbia can provide easily for the requirements of a considerable population, and at the same time contribute every facility for the further development of its mineral wealth.

Without pausing to dwell at any length upon a description of the native tribes, their language, habits, and superstitions, it may be remarked briefly that the statements which have been put forth in England to the effect that British Columbia swarms with bloodthirsty savages are almost wholly untrue. Although it cannot be denied that upon some occasions, when exasperated by drink or by interference with their lands, their women, or their superstitions, they have committed fearful crimes, it may be positively asserted that by nature they are a harmless, peaceful, and by no means bloodshedding people. The writer has travelled among them for years, and only once met with annoyance or interference. Degraded and immoral they certainly are, and, indeed, the whites are communicating to them vices likely to degrade them still further; but as faithful guides through the forest, untiring travellers, and expert canoemen, they are worthy of a great deal of our admiration. With these remarks it is proposed to pass on to the description of the gold-fields.

Cariboo—or, as it should have been more correctly spelt, "Caribou"—so named from its being the abode of that description of the reindeer, is at present the principal centre of gold-mining in British Columbia. This district lies within the great northerly elbow formed, as has been previously described, by the upper waters of the Fraser; and although mining operations have hitherto been limited to a small space on and about the 53rd parallel, the name may be considered as generally applicable to the whole area bounded to the south by the Quesnelle River and Lake, and on all other sides by the Fraser. Cariboo, so far as it has yet been examined, is found to be crowded with mountains of great altitude, very confused and irregular in character, and presenting steep, thickly-wooded slopes. Here and there tremendous isolated masses tower above the general level, rising, in their most elevated parts, to altitudes of 6000 and 7000 feet above the sea. At these high elevations forest-vegetation becomes dwarfed and scanty. Their summits and the upper parts of their slopes may be described as steep downs, clothed with tolerable grass, and dotted with small pine-plantations,—an aspect presenting so marked a contrast to the dense forests of the valleys and lower slopes as to have earned for them amongst the miners the not inappropriate title of "the Bald Hills of Cariboo." Of these, the best known are Mounts Agnes and Snowshoe—the former commonly called the Bald Mountain of Williams Creek—which rise to altitudes of about 6200 feet, and are fair types of the great hill-features of the district. Each, from its comparative isolation, is the nucleus of its own miniature hill-system, consisting of long subordinate ranges, shooting out in every direction from the central mass, and becoming, in their turn, the parent stems of innumerable still smaller spurs and ridges. Thus Cariboo, in its physical configuration, presents a confused maze of peaks and ranges, spurs, ravines, and valleys, preserving no distinct arrangement and bewildering alike to the topographer and the traveller.

Numberless streams of all sizes, from tiny rivulets to moderate rivers, drain the hill-system. The smallest are the "gulches," as miners call them—mere rivulets at ordinary times—which pour down narrow gullies and ravines on the mountain-sides, and any of which may be jumped over. The next are the "creeks," rapid streamlets about the size of an ordinary English brook, which drain the smaller valleys and are at present the scenes of the most active mining. The largest are the "rivers," into which the others fall, and which, from the peculiar position and drainage of the district, although flowing towards every quarter of the compass, eventually conduct the whole of the Cariboo waters to the Fraser.

The forests of the region, which, though very dense and extensive, bear no comparison in point of splendour or luxuriant growth with those of the Cascade Range, nevertheless contain many excellent varieties of pine and fir trees. They abound with martens, marmots, black bears, and some other varieties of furred animals, and the "Caribou" deer is found at the higher elevations. In winter, bands of Carriers—a scattered, intelligent Indian tribe, who occupy a large district north of the parallel 52° 30′—resort to Cariboo from their summer abodes on the large lakes and rivers, and hunt and trap in the mountains, following their game on snowshoes.

While presenting, as will be hereafter described, many phenomena that enlist the interest of the geographer and the geologist, Cariboo is not without features to attract the artist and the lover of wild scenery. Pages might easily be filled with descriptions of the magnificent views to be had in clear summer weather from the summits of any of the loftier hills. In the foreground, a tumbled sea of mountains; narrow, gloomy valleys; forest-clad slopes; and here and there the bleak, unwieldy masses of the bald hills patched with snow: far off, to the south and west, the softer outlines of the central table-lands; to the east, a cheerless, rugged region, crammed with serrated ranges of hills; and away behind them, the peaks and ridges of the Rocky Mountains, glistening with eternal snow, and visible through the clear air at almost incredible distances. These are some of the scenes that reward the tourist in this remarkable region, and furnish the artist with all the elements of grandeur he can desire.

It is late in the morning, even in midsummer, before the sun shines down on the mining-settlements of Cariboo,—brisk, thriving little wooden towns, lying hemmed in by hills in the deep valleys of the mining-creeks, at altitudes of from 3000 to 4000 feet above the sea. Here are assembled a motley population of adventurers of every class in society and from every country in the civilized world: traders, diggers, and idlers, and not a few gamblers and desperadoes,—men for the most part habituated to a frontier life and inured to its attendant discomforts. Indeed, the miner's life among the mountains and streams is fraught with hardship and danger. Few would imagine the amount of patience and endurance exhibited by the hardy pioneers or "prospectors"—those whose especial province it is to prosecute the search after gold. Cold and hunger, inclement weather, weary mountain-marches, constant exposure, and occasional isolation from all companionship, are a few of the discomforts habitually experienced by these sagacious men in their exploration of the country. Strange and touching tales might be told of their adventures in Cariboo, where, from the bewildering nature of the topography, they are frequently lost for days, if not altogether, in the dense forests of the hills and slopes. Not the least touching history is that of one poor fellow, a native of Scotland, who thus became separated from his comrades, and, after wandering about hopelessly for days until his strength failed him, lay down at last in utter despair, and then, after scratching his own epitaph on his tin cup, composed himself quietly to die.

The inclemency of the weather in Cariboo, and the rigour and length of the winter season are serious barriers to the proper development of its mineral wealth. At the end of September the first snows fall in the valleys, the mining "claims" can be "laid over"—that is to say, the laws which oblige miners to be at work on the spot are remitted for the time—and the greater part of the population retire to spend five or six months in the milder climates of the south. The winter weather consists of a succession of severe snow-storms, and fine clear intervals; the thermometer sometimes falls as low as 40° below zero (Fahrenheit), and every stream and lake becomes solid ice. Snow lies on the ground to a depth of about 6 feet in the valleys and accumulates in tremendous masses on the hill-tops, and all travelling, except on snowshoes, is suspended. During winter, surface-digging is naturally discontinued, though, from the absence of floods, deep underground excavations can then be prosecuted with all the more advantage, the auriferous gravel being brought to the surface and heaped in readiness for "washing" in the spring. Towards the end of March the streams begin to melt, and by May the thaw is at its height. Then Cariboo is by no means an enviable locality. Steaming mists envelope the forests in gloom, and the trees drip perpetual rain; trails and mountain-slopes become swampy and abominable to the last degree; creeks overflow their bounds; diggings become flooded, and the miners embarrassed by surplus water; and travelling is a toilsome operation for both man and beast. At this season hundreds of animals, carrying in the first convoys of provisions to the mines, succumb to want of food and exhausting journeys over wretched mountain-paths; and to this day the most loathsome, if not the saddest, sights that greet the traveller in Cariboo are the numberless carcasses of horses that have thus been literally tired to death, and generally left to rot on the wayside where they fell. On the 1st of June miners are compelled by law to be present and at work on their "claims." Then succeed two months or more of mild weather and drenching rains, notwithstanding which digging goes briskly on. In August and the early part of September a few weeks' bright sunny weather may be expected; the region now wears its most favourable aspect, the creeks fall rapidly, and the miner's harvest is at its height.

The radiation of groups of streams from within small areas on the upper slopes of the bald hills is one of the most peculiar features of the topography of Cariboo. From within a circle of not more than 3 miles in diameter, on the summit of Mount Agnes, issue the head-waters of five of the most notorious creeks in the district, their directions being towards every quarter of the compass. Similarly, the sources of no fewer than six others are contained within a small area on the summit of Snowshoe Mountain. The ancient and existing channels of these streams are the great depositories of the alluvial gold of the region,* the richest accumulations being found immediately over the bed-rocks, or rocks *in sitū*, which lie at all depths down to 150 feet below the surface of the soil. In Cariboo these bed-rocks are metamorphic clay-slates, traversed by broad

* But, although gold collected by water-action is thus found in lines radiating from a central point, it will not, on that account, be for one moment supposed that auriferous rocks "radiate" in that manner. It is probable, nay almost certain, that rocks containing gold in matrix are pretty generally distributed over the whole of the districts coursed by these streams, although the water-channels at present afford the greatest facilities for mining.

bands of quartz. It is probable that all the particles of gold now found in the water-channels have, in the course of ages, been loosened, by water-action and other natural processes of disintegration, from their position in matrix in the native rocks of the region, and been eventually transported by the torrents to the localities where they are now found accumulated. As yet, the alluvial deposits in the immediate neighbourhood of the two great bald hills above mentioned have proved to be so extensive and remunerative, and, withal, so comparatively easy of access, as to have almost wholly engrossed the miners' attention. Indeed, it is confidently asserted by the most experienced diggers from California and Australia that, on 3 miles of Williams Creek—the present focus of Cariboo mining—more gold has already been extracted from the earth than from any corresponding stretch of mining-ground in those countries. For reasons which will presently appear, no extensive system of "prospecting" the whole region has as yet been attempted. But, judging from analogy, there is every reason to conjecture that the slaty gold-bearing rocks will be found to be distributed over a far greater area than has hitherto been examined, and that an extended system of exploration cannot fail to result in the discovery of fresh groups of streams, issuing from the slopes of neighbouring bald hills, and containing their rich hoards of alluvial gold. It would certainly be difficult to believe that the half-dozen water-channels which have yielded nearly all the gold hitherto exported from Cariboo can be the only rich spots in the region, or that a Williams Creek can have no associates of its own calibre; and, hence, it may fairly be inferred that the alluvial diggings of Cariboo promise, of themselves, to afford lucrative employment to a large mining population for many years to come.

Apart, however, from the question of alluvial wealth, it may be assumed with almost absolute certainty that the auriferous veins which permeate the parent ranges—and are believed to have supplied by their partial disintegration the gold found in the river-beds—are not yet wholly exhausted of their treasures; and that, eventually, the more costly and elaborate operations of quartz-mining will, under an improved condition of civilization and commerce, engage the attention of capitalists. If this assumption be correct—and there is little room for doubt as to its accuracy—Cariboo, even as it stands at present, and without reference to the other unexamined localities in the immediate neighbourhood, must be regarded as one of the richest and most inexhaustible known gold-fields in the world.

Williams, Lightning, Antler, and Lowhee Creeks, are the most remarkable in the district. On each of these, the gold, though all of the description termed "coarse," nevertheless differs materially both in appearance and intrinsic value. On Williams Creek, for instance, the particles are smooth and water-worn, and contain a large amount of alloy; whereas, on Lowhee Creek, not 5 miles off, they are more crystalline in structure and exceedingly pure; the latter, when assayed, being found to yield nearly 8*s*. per ounce troy more than the former. And on no two creeks do the particles bear an exact resemblance in character to one another. A no less remarkable feature of the auriferous districts is the unevenness with which the alluvial deposits of gold are scattered over the bed-rocks. The larger particles are generally found to be accumulated in detached heaps, in rich "pockets," in crevices and angles of the rocks, and the "leads," or strata of highly auriferous gravel, are marked by a constant succession of wide intervals and abrupt changes in level and direction which baffle the most experienced miners. From this peculiar inequality of distribution it arises that, whereas those who are lucky enough to alight upon the rich "leads" or "pockets" rapidly amass considerable sums of gold, the less fortunate miners, who happen to possess "claims," or allotments of mining-ground, in neighbouring, though comparatively unproductive, areas, derive but little benefit from their labours. Enormous sums are thus being constantly squandered in fruitless mining-operations, and cases of utter failure are, as a consequence, exceedingly numerous.

Nevertheless, the gross annual proceeds from the mines continue year by year to increase, and have at length reached to an enormous sum. It is estimated that, during the height of the last summer season, the average daily harvest upon Williams Creek alone amounted to no less than 2000 ozs., or over 6000*l*. sterling. The principal partner in the notorious Cameron claim returned to his native town in Canada three months ago with 30,000*l*. in his pocket, all amassed in one year. And an almost incredible instance of rapidly-acquired wealth is that of the three partners in the "Hard Curry" Company, who, one evening in the spring of last year, returned to their tents with 102 lbs. weight of gold (about 4000*l*. sterling), as the result of a single day's labour on their claim. These, it need hardly be mentioned, are exceptional cases, but they are of interest, as serving to indicate the amazing wealth of some of the rich "pockets" before alluded to. In this manner, numbers of miners have, during the last three years, been enriched in the course of a few weeks or even days. Hundreds, on the other hand, have realised but little at the end of their season's work; and it is to be feared that by far the greater proportion have with difficulty cleared their expenses. Hitherto, indeed, the cost of working claims and prospecting water-channels has been so enormous as to have proved a very serious detriment to the general prosperity of the district. Nor are other drawbacks wanting. The severity of the weather, the shortness of the summer season, the peculiar hardships of life in the wilderness, and the fatigue and expense incident to the journey from New Westminster to Cariboo, are elements little conducing to rapid occupation or successful mining. But, in the main, the tardy advancement and expansion of the mining-districts has been due to the exorbitant prices of labour, food, and material. The tax upon the clear profits of steadily-paying claims has thus been enormous. For example, one famous company on Williams Creek extracted 40,000*l.* worth of gold last year from their claim, yet were only able to declare dividends to the extent of 20,000*l.*; exactly one-half of the entire proceeds having been swallowed up in the shape of expenses. And this is but one of many instances of the same kind. They will excite but little surprise, however, when it is explained that the gold-field is situated 500 miles in the interior of a young colony, hitherto unprovided with good roads, and almost wholly destitute of any but imported supplies. Until quite recently, nearly every pound of provisions for consumption at the mines—fresh animal and vegetable food alone excepted—to say nothing of the necessary supplies of tools and material, was carried for hundreds of miles into Cariboo on the backs of mules and horses, and even of the miners themselves. Hence, the price of every imported article rose to an enormous figure at the diggings. Even flour has for years past cost on an average 4*s.* a pound. Twenty shillings have been given for a pound of common nails, and half as much again for a mess of fresh vegetables. This high tariff of provisions and material created a correspondingly high scale of pay for labour. The ordinary navvy received from 30*s.* to 40*s.* for his day's work, while the mechanic might earn from two to three guineas; and, in the experience of the writer, a hair-cutter at Lightning Creek charged at the rate of about 7*d.* a minute for his services.

While exacting heavy tribute from the richest and most successful diggers, these enormous prices, together with the limited and frequently overstocked condition of the labour-market, fell upon the needy and unsuccessful with an effect that was absolutely ruinous. Men of slender means, and others who had quickly sacrificed their capital in fruitless mining-operations—unable to get employment, or to support themselves in a country where it cost from 15*s.* to 20*s.* a day to procure the bare necessaries of life—hurried away almost as soon as they came, without pausing any longer to "prospect" in so expensive a locality. In this manner anything like a deliberate examination of the country has been completely prevented. Moreover, by reason of the extravagant cost of every commodity, continuous mining-operations have hitherto been practically limited to the very richest spots in the district, and, even then, to the most productive strata of auriferous gravel. In localities where hired labour cost 40*s.* a day, it became obvious that it would never pay to work diggings which would not yield at least that amount to the individual labourer, over and above all contingent expenses. On this account, the operations of working claims have been confined to the gravel lying immediately upon the bed-rocks, where the richest deposits are found; and the upper strata, containing amounts of gold, which, but for the enormous price of labour, would have well repaid the cost of working them, have been left altogether untouched. In like manner, surface-diggings—capable under more favourable circumstances of supporting a large mining-population—remain as yet undisturbed.

It is no wonder, then, if in the face of all these impediments the actual profits of Cariboo mining have, in the majority of instances, been far from considerable. Nevertheless, there can be no doubt, upon a consideration of the history of the region up to the present time, that it teems with productive gold-mines, practically boundless in extent, and promising lucrative employment to thousands so soon as an improved system of communications and commerce shall admit of their fuller development, and of the introduction of the many economical appliances of civilization.

Cariboo, however, is by no means the only auriferous district in British Columbia. The bars of Fraser River, throughout the greater part of its course, are not nearly stripped, as yet, of their accumulations of "fine" gold. Moreover, the accuracy of a theory long ago advanced by the present distinguished President of the Royal Geographical Society—to the effect that gold in the matrix would be found distributed all along the hilly districts bordering on the western slope of the Rocky Mountains—is yearly being more and more satisfactorily established. Desultory explorations, made at different times within the last four years, have resulted in the discovery of a chain of auriferous deposits, extending at intervals from the southern boundary of the colony to the 56th parallel of latitude, and preserving a direction parallel, or nearly so, to the crest of the Rocky Mountains. Rock Creek in the extreme south, the head-waters of the Okanagan, the tributaries of the north and south branches of the Thompson River, the south and north branches of Quesnelle River, Cariboo, and, finally, Peace River, near its intersection with the meridian 122° w., are so many successive points in this chain, at all of which gold in varying quantities has been found. These and other intermediate discoveries have established, almost beyond a doubt, the existence of a vast auriferous zone or belt of country, more than 500 miles in length, comprising within its limits the sources of all the great gold-yielding streams that water British Columbia; and forming, in all probability, the depository of incalculable wealth.

Should this range indeed prove, upon future examination, to be the matrix of the auriferous wealth of the colony, there can be no doubt that British Columbia must in time become, steadily but surely, one of the most important dependencies of the British empire. The certainty of the possession of extensive and practically inexhaustible gold-fields along the immediate outskirts of the central belt would at once impart a wonderful stimulus to the settlement of its agricultural and pastoral lands, and at the same time improved communications would ere long be established. Thus the enormous prices of labour and commodities in the gold-regions would rapidly disappear, and full scope be afforded for the proper and patient exploration of the mineral wealth of the land.

The first steps towards improvement have been already made. Settlement, as has been before remarked, is gradually creeping over the midland districts; and, even now, Cariboo, one point in the auriferous range, is beginning to enjoy the advantages derivable from cheap communication and the cultivation of neighbouring districts. The efforts of the local Government within the last five years have at length resulted in the completion of a system of excellent waggon-roads, leading through the most promising districts of the colony to within a short distance of Cariboo. Miners or others, to whom time is of value, need no longer perform weary journeys on foot or on horseback over wretched trails and through an uncivilized if not totally uninhabited country. A steamer-voyage of 90 miles from New Westminster terminates at Yale, the head of steam-navigation on the Lower Fraser. Throughout half this distance the river winds among the gorgeous forests of its estuary, slight clearings here and there revealing native villages and the shanties of the woodmen who prepare fuel for the steamers. Higher up, the hills approach the stream, the current becomes rapid, and small Chinese mining-camps dot the banks and bars. From Yale upwards, a noble road executed at vast labour and outlay enters the passes of the Fraser, and traverses the faces of cliffs and precipices and slides of disintegrated rock, that, two years ago, seemed to bid defiance to any efforts of the engineer. For 60 miles upwards it winds through the magnificent scenery of the Cañons—the subject of a former description—crossing over to the left bank of the river by a suspension-bridge thrown across the chasm at a point where it is only 90 yards in width. Soon after passing Lytton the forest is left behind, and the road approaches the belt of pastoral country, and, gradually emerging from the Cascade Range, reaches the green hills and valleys and the picturesque country of the central districts. From a point 20 miles below Fort Alexander the Fraser may again be ascended in a small steam-vessel built on the spot, for which all the machinery and fittings were carried up on mules' backs long before the road was finished for waggon-traffic. Disembarking at the mouth of the Quesnelle, the traveller reaches Williams Creek by a ride of 60 miles over the one good trail in Cariboo. A westerly loop of this route, branching off 40 miles above New Westminster, passes through a low gap in the Cascade Range, along a chain of lakes connected by roads, and rejoins it 150 miles south of Fort Alexander.

It has been considered questionable whether the Fraser River is likely to continue to be the great avenue for the conveyance of all traffic towards the mining-districts, and several of the more northerly inlets on the coast have been recently examined with the view of discovering a shorter route to Cariboo. The results of these examinations are on the whole discouraging. It appears, from reports on the subjects, that while the rivers which discharge into these inlets are unnavigable for steamers, and facilities for the establishment of seaport-towns almost wholly wanting, the districts which would be traversed in crossing from the coast to the mines are generally sterile and unattractive, and lie at too high an elevation to admit of the establishment of really good permanent routes. Moreover, it is shown that the actual shortening of the amount of land-communication would be almost inappreciable, since the Fraser admits of navigation both in the lower and upper portions of its course. These and other drawbacks are likely to lead to the abandonment of any projects for the establishment of coast-routes for at any rate some time to come, and, keeping in view the probable extension of the gold-fields southward from Cariboo, it seems likely that the existing routes will in future be adopted as the permanent highways of commerce.

The journey from New Westminster to Cariboo, by either of these routes, may now be easily accomplished in from six to seven days. As yet the benefits arising from improved communications have hardly had time to become manifest, for it was not until the close of last summer that the new roads were thrown entirely open for traffic; but already inns and incipient farms, dotting the wayside at almost every turn, mark the first growth of settlement, and begin to break the solitude of the journey. With new roads, a new day has dawned upon British Columbia. Already the foundations of its ultimate prosperity seem to have been securely laid, and it only remains to hope that in days to come its rich harvests may be participated in by British subjects much more largely than they are at present.

From its advantages of geographical position, its vast mineral wealth, its salubrious climate, and valuable natural products, it seems but fair to anticipate that, under good government and by a process of gradual development, British Columbia will ere long take rank as not the least important of the Colonies of the Crown.

XI.—*Notes on the Zambesi and the Shiré.* By the late Mr. Richard Thornton. (Addressed to Sir R. I. Murchison, Pres. R.G.S.)

Read, November 9, 1863.

Shupanga, January 7, 1863.

My dear Sir Roderick,—I last wrote to you from this place on July 14th last, on the *Pioneer* leaving here for Johanna: during the three months after that I worked away at my map of the Kilimanjaro, &c., interrupted twice for a week together, and several times for a few days, by sickness and the arrival and departure of friends, &c. The Ugono range and contour lines cost me much trouble and time in drawing, correcting, and redrawing over and over again: the latter are carefully drawn from my sketches, observations, and recollections, and although they cannot be accurate, they will give a much better idea of the shape of the mountains than shading would do. It was not until the 3rd of November that all—map, copy, and calculations, &c.—was finished and despatched *viâ* Quillimane to the Baron von der Decken at Zanzibar.

On November 7th I left Shupanga for Senna, staying a day on the way at Shamvara. From Senna I wished to go on to Yorongozo and Manika (to the south and south-west); but owing to the great famine which this year reigns throughout the country, no provisions could be procured on the way. I, however, succeeded in buying a month's supply of Quillimane rice and started up the river to examine the country lying to the north of the Zambesi and west of the Shiré; but owing to the disturbed state of the country (the followers of three rebel half-castes plundering in different directions), and the drought and famine obliging me to carry both water and provisions, I could not persuade my men to follow me far. I was, however, favoured with very clear weather, so that I got many good rounds of theodolite angles for a map, and three good views over the Shiré valley from mountains on its western side. I then went on to Lupata and spent there four days in examining the geology and taking theodolite angles and sketches, &c. My provisions being then nearly finished, I made all speed to Teté, which I reached on December 17th. The rains commenced with me on December 4th, with heavy storms; from that time till my arrival at Teté I had few dry days or nights. I have never felt the heat so great as during November and part of December last.

At Teté the famine was very severe; the natives were mostly dispersed in the woods far away seeking for wild roots and fruits, leaving only a few behind to look after the young crops. On November 16th, after an excessively hot day, a great hurricane, accompanied with hail, broke over Teté, and in a few minutes unroofed about half the European houses in the town and sadly damaged the few shady trees: some of the hailstones were as large as pigeons' eggs. Excepting the results of the storm, the town was much improved since I last saw it, the Governor having employed the prison labour in making streets and cleaning the place. I remained there over Christmas Day, receiving every kindness from the Governor and my old friends.

I left on the 27th with three weeks' provisions, intending to finish my examination of the country to the north of the Zambesi; but in Lupata a number of sores broke out on my feet and ankles, which, aggravated by two days' rough walking, became so bad that I thought it best to go on with all speed to Shupanga, having heard of Dr. Livingstone's return there. I arrived here in safety on the evening of January 2nd, and have since been unwell, but am now getting all right again, excepting the sores on my ankles. I hope to leave here shortly to examine the Morambala and neighbouring hills, then up the Shiré to the lakes, doing and seeing as much as I can on the way.

The most important geological point I have observed on this journey is the much greater importance of what I have before called the "coast tertiaries" in the structure of the country, than I formerly considered them to have. They are found on the south bank of the Zambesi from Shupanga to Lupata, and on the north bank from Senna to Lupata. Here they consist chiefly of soft white sandstones, gravels and much conglomerate: above Senna the prevailing colour is reddish; the stratification is horizontal, forming nearly level plains and a low, long flat-topped plateau, and hills. On the north bank of the Zambesi from opposite Senna to half way to Lupata, they are metamorphosed and mixed with much greenstone and some volcanic rocks. The strike is about parallel to the river and the dip about 15° towards the south-west. To the north of Senna they are succeeded, at a few miles from the river, by the semi-metamorphosed Teté sandstone formation, striking about north-west and south-east and dipping at a high angle to the north-east, forming a range of mountains bounding the Shiré valley: a mass of porphyry and greenstone here separates the two formations. Farther up the Zambesi, a few miles inland, the semi-metamorphosed Teté sandstone formation again appears, but with a very different strike and dip, viz., strike about N.N.E. and S.S.W., and dip at a very high angle to the E.S.E. (in no other part have I seen this sandstone formation with so great a dip). Still farther up the river, a few miles inland, the old gneissic formation is found, the strike of the lamination being about north-west and south-east, and the dip at a high angle to the north-east; but the strike of the bedding appeared to be more nearly north and south, and the dip west at about 60°. I here found fragments of coal in the bed of a river flowing from the mountains which form the western boundary of the Shiré valley.

The pass of Lupata is a valley of elevation through nearly horizontal strata of the coast tertiary formation; the dip of the whole is very slightly to the south-east. At the western entrance are sandstones, conglomerates, &c., capped by a great thickness of lavas; both are partially metamorphosed, so that the bedding of the lavas is very indistinct and joints are strongly developed. In the centre of Lupata both these rocks are much metamorphosed into various porphyries, &c., and in the mountains to the north and south of the pass the sandstones, &c., appear to overlie the lavas in great thickness. I found one fossil—a water-worn lump of coral—in the sandstone near the western mouth of the pass: it is the only fossil I have found in this formation in the Zambesi region.

From the rock specimens brought, and the description given me by Dr. Kirk, of the Rovuma River, I believe the coast tertiaries extend a considerable distance up that stream. The only fossils he found were specimens of fossil wood: he has one beautiful specimen of silicified wood, with the bark still remaining. Beyond the tertiaries the Teté sandstone and coal formation probably follow, as they found some fragments of coal in the bed of the river.

In my next letter I hope to give you something of the main structure of the country, which is, I think, now coming out very simply, but slowly, owing to the greatness and the difficulty of exploring in any particular direction.

I have decided to return to England this year, if possible, so that there is little or no chance of my crossing or reaching the main axis of the structure, and probably I shall also have to give up my long-intended exploration of Manica and other districts.

RICHARD THORNTON.

[Between the date of the foregoing letter and his untimely death, Thornton had few further opportunities of adding to the store of geological and geographical information accumulated in his journals. He left Shupanga on the 17th of January, in his own boat, expecting to overtake Dr. Livingstone and the rest of the expedition who were attempting to ascend the Shiré in the two steamers, the *Pioneer* and the *Lady Nyassa*. It was his intention to ascend this river and explore, as far as practicable, Lake Nyassa, hoping to do this and reach Zanzibar on his road to England by July or August. His journal records a wet and stormy voyage up the Shiré, during which he had many sleepless nights and in the daytime suffered much from the stifling heat which prevailed in the intervals between the storms. He overtook the steamers on the 28th of January near the "Elephant Marsh" on the Shiré, and accompanied them in their slow progress amongst the shoals of that much-obstructed river until February 13th, when he started alone for the Mission Station. Arrived there he found the whole district suffering from famine, and a journey overland to Teté to purchase cattle being proposed, Mr. Thornton volunteered to undertake it in company with the Rev. Mr. Rowley. The privations and exposure to which he was subjected in the toilsome walk over the country to Teté and back, encumbered with the charge of more than 100 head of sheep and goats, seem to have tried much a constitution already weakened by previous over-exertion. He returned to the Mission Station from his successful trip on the 2nd of April. On the 11th, having rejoined Dr. Livingstone on board the *Pioneer*, he was taken ill with dysentery and fever, and on the 21st he died. The Rev. Mr. Rowley, on receiving notice of the critical state of his friend and late companion, hastened to the place where the steamers lay, hoping to find him still alive; but "death," as he records the event in his journal, "was beforehand with me—when I arrived I found all hands assembled around his grave." A copy of Mr. Thornton's Journals, made by his sisters, has been presented to the Society, and will be bound and preserved in the Library. It forms eleven large volumes of MS., and includes, as mentioned by the President in his last anniversary address, "the details of upwards of 7000 observations made to fix geographical points and to determine altitudes" in the Zambesi region. The Journals also contain an immense amount of geological and mineralogical data, the correlation of which will be perhaps an almost impossible task in the absence of their gifted author.—ED.]

XII.—*On a few Fossil Bones from the Alluvial Strata of the Zambesi Delta.* By JOHN KIRK, ESQ., M.D., F.R.G.S.

Read, April 25, 1864.

THE following notes relate to a collection of fossil remains found in the bed of a stream which joins the Zambesi 40 miles from the present coast-line, near the head of the delta, and which carries off, during the rains, the surface-water from the plain to the coast.

The fossils occurred loose, mingled with quartz pebbles, and nodules of indurated ferruginous clay, polished and blackened. They had been transported by the rush of water from a little way inland, and were more or less rounded, but perfectly formed whenever the matrix adhered. This resembled the soil of the delta; being a clay mixed with sand, and impregnated with titanic iron.

Of Mammals, bones and teeth of large antelopes, probably the Eland and Kobus, were most abundant; next, those of the buffalo, hippopotamus, wart-hog, and lion. Among reptiles, fragments of the osseous back of the water-tortoise, and crocodile bones were found; the former being the most curious of all, with the exception of the vertebræ of antelopes. Although no entire skull or long bone was found, the vertebræ were well preserved, as also were the ribs, which made the absence of long bones of the limbs the more remarkable.

Besides bones there were many fragments of pottery, rounded on the edges and having in some cases the same clay matrix adhering to them. The surface of the ware was polished and blackened in the peculiar manner found in the tropics. A fresh fracture had the same appearance as the half-baked pottery now in use; but the surface markings differed from any known to Dr. Livingstone or myself. The presumption seemed to be that, like the bones, they had been washed from some of the clay strata cut through in the course of the creek; but, from an opportunity of following it up not presenting itself, it is doubtful whether both had come from the same locality.

Villages in that region at the present day are commonly placed near a lagoon or creek, and all refuse cast out speedily rolls down into the water. Besides, many tribes have now a superstition, which leads them to cast the bones of any animal eaten at once into the water. That these bones have never lain for many months on the plain is quite evident; for in these parts, under the powerful action of sun and moisture, disintegration speedily ensues even in solid bones. Although wounded and dying animals, such as buffalo and water-buck, often betake themselves to the shelter of a marsh and there expire, it must be seldom that their remains are favourably situated for becoming imbedded in the clay strata.

Further researches in similar situations in Africa, and in the plains left by the shrinking waters of the Nyassa Lake, may yet afford some information respecting the former inhabitants of that continent, of whom we have at present no knowledge. The present race will leave behind them nothing but such remains as those we have found in the Zambesi delta. In passing through a country which a few years before had been thickly peopled, the only signs of former settlements consisted in the stones used in grinding corn; but in a purely pastoral region even this would not have been left, while the remains of animals could have been preserved only in places where they have been cast into water and buried up speedily in mud.

The few specimens which have reached us out of the number we collected belong to species now existing in the Zambesi delta; the buffalo, the *Crocodilus vulgaris*, and the water-tortoise. As to the others, no difference was remarked when I examined them whilst in the country. The teeth and tusks of the hippopotamus were certainly identical with those of the species now existing in the river.

Similar phenomena were observed on the western shore of Lake Nyassa, which, in shrinking, as proved by elevated sand-beaches, has left clay-flats now crossed by affluent streams. At the mouth of one of these, portions of the frontal bone of an animal and the back of a tortoise were found semifossilised polished and blackened, along with indurated clay nodules, just as on the banks of the Zambesi.

XIII.—*On the Antiquity of the Physical Geography of Inner Africa.* By SIR RODERICK I. MURCHISON, K.C.B., Pres. R.G.S.

Read, April 25, 1864.

WE must all regret that the fossil bones collected by Dr. Livingstone and Dr. Kirk, and which the last-mentioned gentleman has described, should be a remnant only of those remains, and other natural history objects, collected by him. His chief collections having been sent by trading vessels to Mosambique, and, not having yet reached this country, it is feared they may have been lost. The geological maps of Mr. Richard Thornton (excepting one of the Kilima-njaro snowy mountain, which he prepared when he was the companion of Baron C. von der Decken), including those which he was busily occupied in terminating when he died in the Zambesi country, have in like manner been sent away in ships, which have not been heard of, though we may hope that these as well as the collections of Dr. Kirk may still be recovered.

The great interest which attaches to the relics saved by Dr. Kirk is, that though they have been so long entombed in argillaceous drift as to have lost their gelatine, and to have become truly fossil, they all belong to the same species of animals which are still living in South Africa. This, indeed, was the opinion of Dr. Kirk, when he placed these bones at my disposal, as being those of a buffalo, a crocodile, and a water-tortoise. With these were quantities of bones of the various species of antelopes and other animals which now inhabit South Africa, including hippopotami. Prof. Huxley also has at my request examined the vertebræ of the fossil buffalo, and he has identified them with the bones of the living Cape buffalo.

On my own part, I may observe that this discovery strongly supports the theoretical view which I put before this Society in the year 1852,* viz., that Central South Africa had, from the remotest secondary period, or that of the fossil reptile Dicynodon, maintained its undisturbed lacustrine and terrestrial characters up to our own days. I suggested, in short, that what Africa was when the Dicynodon lived would be found to be true in the present day, by our finding a series of lakes and marshes in the centre of the country, the waters of which, occupying plateaux, escaped through fissures in flanking and higher coast ranges of older rocks. I have in subsequent addresses reverted to this view as confirmed by advancing discoveries.

Livingstone demonstrated the truth of this theory as regarded the Zambesi, and it has been well sustained in other regions (particularly in Central Equatorial Africa), by the researches of Burton, Speke, and Grant.

The point to which I specially wish to direct the attention of the Society at present is, that in none of these adventurous journeys in the interior have the travellers met with marine fossiliferous formations, which would indicate that this continent had been submerged, like most other countries, during the secondary, tertiary, or modern periods. Nowhere have they detected limestone with marine organic remains, though I specially urged both Livingstone and Speke in their last journeys to endeavour to discover such rocks. The late lamented Mr. Richard Thornton, the accomplished young geologist who accompanied Livingstone, was moreover particularly charged to look keenly for such reliquiæ, and with all his zeal he found fossil *land* plants of the carboniferous era only.

The only marine shells which have been detected, occur on or near the coasts. Some of these are of Eocene nummulitic age, and others, as at Natal, indicate a very recent elevation of shore deposits. In a letter to myself, Mr. Thornton describes these tertiary rocks as occupying a coast ridge rising to 200 and 300 feet above the sea on the mainland opposite to Zanzibar, from observations which he made when he accompanied Baron von der Decken to Kilima-njaro.

Let it, however, be clearly understood that my view of South Africa applies to the great interior only. For, geologists have long been aware that the Cape Colony has an external fringe of hard ancient marine deposits of palæozoic age, associated with rocks of igneous origin.

That there exists a framework of old rocks is manifest indeed from the excellent geological map of the Cape Colony, by Mr.

* See "Comparative View of Africa in Primeval and Modern Times," 'Journal of the Royal Geographical Society,' vol. xxii., Pres. Address, p. cxxi.

A. G. Bain, as well as from the explorations of Livingstone, and the observations of Richard Thornton. From Mr. Thornton's journals, copies of which have been placed in my hands, I find that granitic, syenitic, felspathic, and porphyritic rocks of igneous origin, with highly metamorphosed, schistose, and quartzose rocks of great age, occur on the banks of the Zambesi. He also describes near the rapids and falls above Tete various beds of coal in old sandstones, shales, and conglomerates. It is therefore evident that the older or palæozoic rocks of geologists form the nucleus of the continent. At the same time there is no evidence of the existence of any of the younger fossiliferous marine rocks in Inner Africa. My belief is, that the superficial deposits which there exist have been alone formed by disintegration of the old rocks, and that the accumulation of sand, clay, and pebbles, which diversify the surface, are purely of terrestrial or lacustrine or fluviatile origin. This view is indeed to be inferred by simply referring to Mr. Bain's excellent memoir on the geological structure of Southern Africa, which shows that the crystalline and palæozoic rocks were succeeded in the very ancient days of the bidental reptiles, by lacustrine deposits only.*

Whatever rocks have since been examined in the interior and to the north, such as sandstones and clays, often ferruginous, and tufas arising from calcareous springs,—every known feature indicates that terrestrial and fluviatile conditions only prevailed throughout those wide regions and during enormously long periods. The only striking fossil shell, indeed, which Speke found in a ridge at a great distance from the coast, proved to be a large Achatina, similar in form to the *A. perdix* now living in South Africa, and with it was associated a small shell like a Potamides.

The observations of other travellers,—whether made by Livingstone in his first journey across South Africa, between St. Paul de Loanda and the mouth of the Zambesi, or in his recent explorations up the Shiré (in which he was accompanied by Dr. Kirk and his brother Charles Livingstone), when he examined the shores of the Nyassa Lake, or by Burton and Speke, and Speke and Grant, in their respective journeys,—have all equally failed in discovering any inland formation or deposit in which are imbedded fossil marine remains of secondary or tertiary age.

On the contrary, with sandstones, often ferruginous, resting on granites and a very few other rocks, whether quartzose, argillaceous,

* See 'Transactions of the Geological Society of London,' vol. vii. N.S., p. 178, and Map. See also the admirable papers of Professor Owen in the same volume. The great number of these bidental lizards found by Mr. Bain, and the absence of all marine shells, lead me to believe that the Dicynodon lived as Mr. Bain suggested, in great marshes and lakes which existed in the interior of the country at the close of the old coal-period.

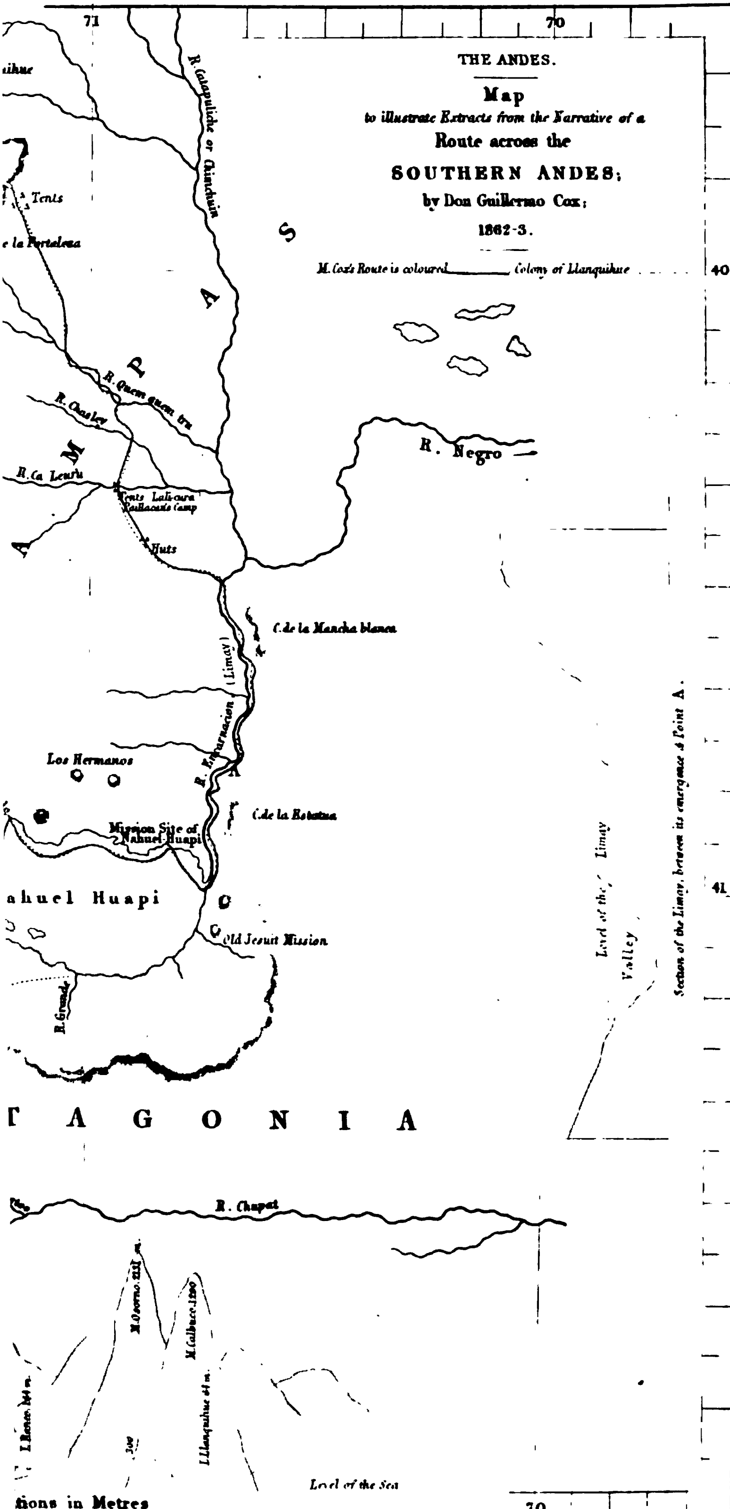
or tufaceous, all the evidences which have been obtained sustain the validity of my hypothesis of 1852, that the same physical conditions have prevailed in Central Africa from those days when that remarkable fossil reptile of the marsh lived, which was discovered by Mr. Bain in the interior of the Cape Region, and named Dicynodon by Owen, and considered to be a representative in old times of the lacertine associates of the hippopotami of the present day. Again, it is to be specially observed, that the vast interior of the South African continent exhibits no signs of sub-aerial volcanoes, and, consequently its surface has not been diversified by the outpouring of lava streams nor broken up in recent times by any efforts of subterranean heat to escape.* Nor has it been subjected to those great oscillations by which the surfaces of many other countries have, during the glacial period, been so placed under the waters of the ocean as to have been strewed over with erratic blocks and marine exuviæ. For, if South Africa had been beneath the sea during the glacial period, its surface would unquestionably have erratic blocks derived from the high, rocky glacier lands of the Antarctic Pole, just as many low countries of northern Europe were, as geologists know, covered with Arctic and Scandinavian blocks during the same glacial period (see 'Russia in Europe and the Ural Mountains,' pp. 507-556, with map defining the southernmost range of the south of the Scandinavian erratics). But not a single Antarctic or other erratic block has ever been detected in South Africa, even in the colony of the Cape of Good Hope.

The interior of South Africa may therefore be viewed as a country of very ancient conservative terrestrial character,—a country in which its animals have lived on during a vast length of time undisturbed by those great perturbations which have affected other countries.

It is right to observe, that whilst Dr. Kirk is of opinion that certain small pieces of pottery, which were found with the bones, may be of the same age,† it would require more extended and

* This observation applies to sub-aerial volcanoes only. Rocks of ancient igneous origin are known to occur in the Cape Colony, and elsewhere in the *coast ranges of hard old rocks*. On the east coast the flanking range through which the Zambesi escapes to the sea, rises in altitude from south to north, and attains its greatest height in the snow-capped mountain Kilima-njaro. That mountain being to a great extent composed of trachyte, may have been in igneous action under the atmosphere in a recent geological period. This point, however, has no real bearing on my view of the long continued and undisturbed terrestrial surface of the *interior* of Africa south of the Equator.

† In a letter to myself Dr. Livingstone speaking of these fossil bones says, "The bones were discovered by Dr. Kirk in the upper part of the delta. They were found among gravel, and are probably the remains of animals which lived when the delta began near Mazura. Fragments of pottery were also found amongst the gravel."



THE ANDES.
Map
to illustrate Extracts from the Narrative of a
Route across the
SOUTHERN ANDES;
by Don Guillermo Cox;
1862-3.
M. Cox's Route is coloured
Colony of Llanquihue
71
70
40
41
R. Calapuliche or Chinchuin
Tents
R. Quem quem treu
R. Chasley
R. Ca Leufu
Tents Lali-oura
Paillacoa's Camp
Huts
R. Negro
C. de la Mancha blanca
(Limay)
R. Encarnacion
Los Hermanos
A
C. de la Rotunda
Mission Site of
Nahuel-Huapi
ahuel Huapi
Old Jesuit Mission
R. Grande
AGONIA
R. Chupat
M. Osorno 2131 m.
M. Calbuco 1200
L. Llanquihue 44 m.
Level of the Sea
Level of the Limay Valley
Section of the Limay, between its emergence & Point A.
tions in Metres
J. Arrowsmith

careful observation to show that these fragments of human manufacture and the fossil bones are coeval, though certainly their appearance favours that opinion.

If, however, this point should not be established, yet looking only to the great length of time required to convert bones into a fossil state, we have still every reason to conclude that, in this stable continent, which has through long ages been subjected to atmospheric influences only, the negro type of mankind must be one of very high antiquity. Yet notwithstanding this antiquity, the people of that race have made slight advances in civilization, or in the commonest arts of life, as compared not only with the people of the Caucasian type, but also with those of the Mongolian and Malayan races, or even with the Red Indian and Polynesian races.*

XIV.—*Expedition across the Southern Andes of Chili, with the object of opening a new Line of Communication from the Pacific to the Atlantic Ocean, by the Lake of Nahuel-Huapi and the Rivers Limay and Negro.* By Don Guillermo Cox, of Chili. (Translated from the Spanish, and communicated by Sir Woodbine Parish, K.C.H., F.R.S.)

Read, May 9, 1864.

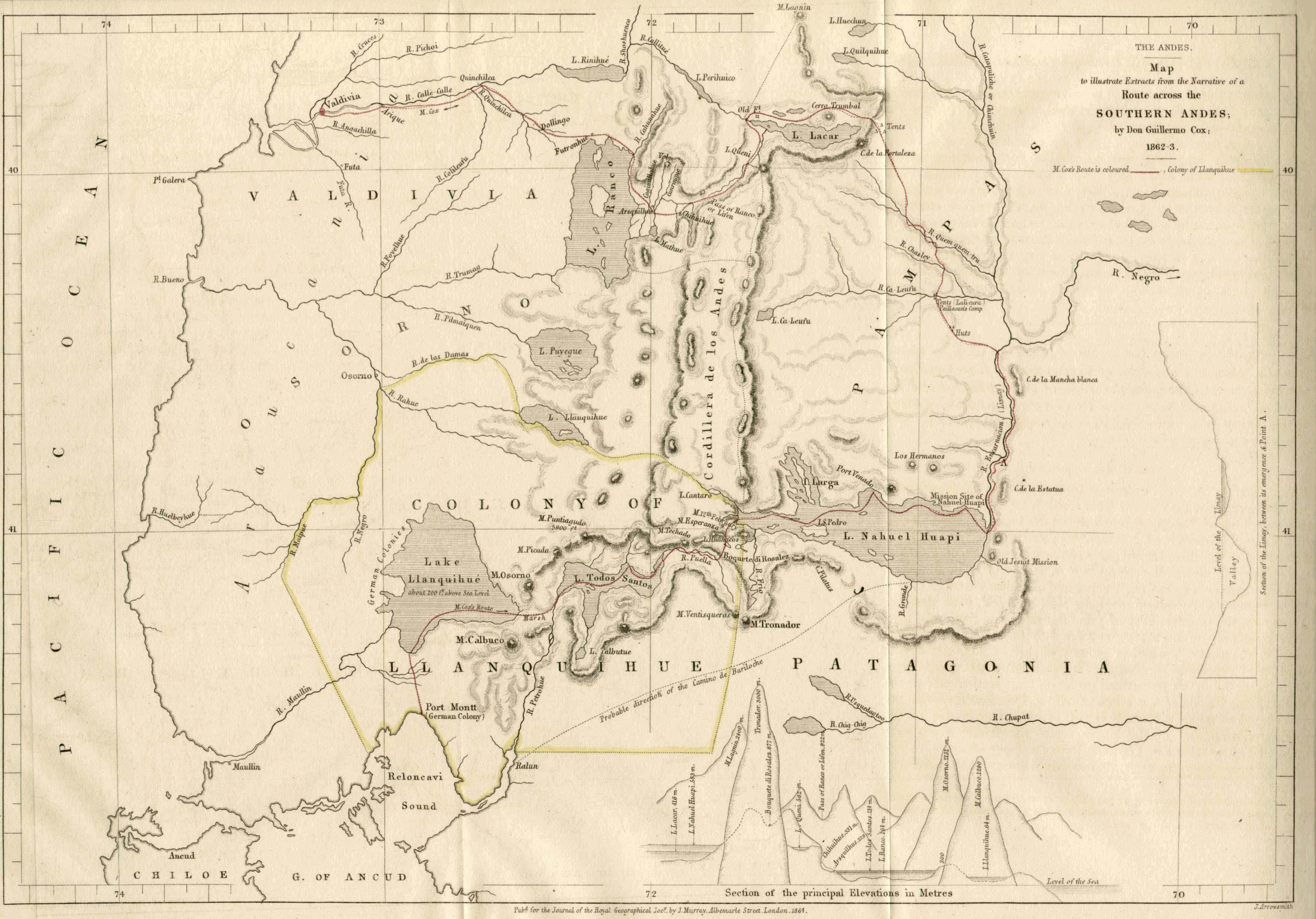
[The following paper is extracted from the Diary (in Spanish) of Don Guillermo Cox, a Chilian born, though of British parentage, who, possessed of independent means which enabled him to carry out his object, determined, towards the close of 1862, to make an exploration of the least known parts of the Andes south of Valdivia, in the hope of being able to open a new line of communication across Patagonia between the Pacific and Atlantic Oceans.

The Spanish Government, so long ago as 1782, were desirous to ascertain the practicability of such a route; not from any idea of the benefit which might accrue from it to their own people, but in order to ascertain whether or not, in case of war, any hostile power, and especially the English, by passing up the great River Negro, were likely to be enabled to reach their settlements on the coasts of the Pacific. A competent officer, Don Bazilio Villarino, was ordered to make a careful survey of the whole course of the river in question, and of the passes across the Andes which were supposed to lead direct to Valdivia, from its upper affluents.

Villarino ascended the river, not however without much labour and

---

* For an extension of this view of the stationary condition of the negro during a very long period, see my last Anniversary Address, 'Proceedings of the Royal Geographical Society,' vol. viii. p. 248.



Pub^d. for the Journal of the Royal Geographical Soc^y. by J. Murray, Albemarle Street, London, 1864.

J. Arrowsmith

many difficulties, in consequence of the low state of the water in the dry season, and reached the foot of the Cordillera. He there found that the Negro was derived from two streams, one running into it from the north, the other from the south; of the latter, which he named the Rio de la Encarnacion (the Limay of the Indians), he contented himself with a very slight examination, rowing up it only a few miles, having learnt from the Indians that it proceeded from the Lake of Nahuel-Huapi, which they described as far to the south of Valdivia.

He then proceeded up the northern branch, called the Catapuliche, till he arrived at a point nearly opposite to Valdivia, which city, the Indians assured him, he might easily reach by a pass well known to them in about four days. A quarrel, however, with the natives obliged him to return without accomplishing his object of crossing the Cordillera.

It seems hardly credible that since that time the river Negro should have never again been ascended beyond the island of Choleechel, which is about halfway up it. In the year 1833 the Buenos-Ayrean pilot, Delcalzis, ascended as far as Choleechel, under the orders of General Rosas.

Sir Woodbine Parish brought to England the original M.S of Villarino's diary, and published it in the 6th volume of the Journal of the Royal Geographical Society; from this Mr. Arrowsmith laid down the true course of the river, showing its connexion, according to the Indian accounts, with the Lake of Nahuel-Huapi, of which little more was known than the fact that in 1670 and subsequently in 1715, the Jesuits had established missions there, which not long after were destroyed and the Fathers put to death by the Indians, in alarm, as is supposed, lest the Spaniards should invade their lands by a pass which the missionaries had discovered and opened through the forests from the Bay of Reloncavi, and by which, as is asserted, they were able to reach their establishment on the lake from the coast in the short space of *three* days.

The road in question is known traditionally as the "*Camino di Bariloche*," and is supposed to run pretty nearly in the direction marked upon Mr. Cox's map; the forests through which it ran have long ago grown over and obliterated all trace of it; but if it be true, as asserted, that it required but three days for the missionaries to traverse it, there must be a much greater depression in that part of the Andes than has hitherto been observed, or at any rate some opening through them of much easier access than any of the passes as yet discovered across the Cordillera, a supposition which it is of the greatest interest to verify.

No further attempt to reach Nahuel-Huapi was made until, in the year 1792, a Spanish priest, Father Melendez, started with a party from the coast to ascertain whether any traces of the old mission were still to be found. They reached the lake of Todos Santos, which they traversed in a boat of their own building, crossed the Cordillera, and succeeded in reaching the lake of Nahuel-Huapi, where some Indians pointed out the site of the old buildings they were in quest of.

A perpetual fear of the indomitable Araucanians seems to have operated as an effectual bar to any further examinations of those regions during the rule of the old Spanish Government. But the successful planting of a German colony by the present Government of Chili, about twelve years ago, at Port Montt, lat. 41° 30′ s., in the Bay of Reloncavi, appears to have led to several attempts on the part of the colonists to collect information not only respecting the lands in their own immediate vicinity, but also those on the opposite side of the Cordillera. The old story of the mission of Nahuel-Huapi was revived, and several attempts were made to reach it. Of these, one of the most successful, was a journey made in 1855 by Don Vicente Gomez, the grandson of an old man settled at Port Montt, who had accompanied Melendez in his expedition of 1792, and was in consequence able to give him much useful information for his guidance. Gomez succeeded in passing the Cordillera by the pass or gorge which he named the *Boquete di Rosalez*, after the Intendant of the colony; and from Mount Esperanza he obtained a distant view of the Lake of Nahuel-Huapi. In the year following Mr. Fonk, the Doctor of the colony, reached the lake by the same route, and returned to Port Montt with many interesting details respecting it. His countryman, Mr. Doll, has given an account of some of these explorations, in the 'Araucano,' a Chilian periodical, and has embodied their results in a map, which has the merit of giving the relative positions of Mount Osorno and Calbuco, for the first time correctly.

Six years later, after a careful study of all the information so collected, and some practical experience acquired in a journey made by himself as far as the Cordillera, Señor Cox determined to make an effort to solve, if possible, the grand problem of the practicability or not of passing from the lake into the River Negro, and thus of opening a new line of communication across the continent from the foot of the Chilian Andes. The results are given in a volume which he has lately published in Chili, containing very full details of his journey and personal adventures, as well as information of great interest regarding the physical geography, geology, and botany of the country he traversed, and of the habits and customs of the wretched Indian tribes who still haunt the eastern slopes of the Chilian Andes.

From this has been prepared the accompanying paper, with a view to giving at least some general idea of what has been accomplished by this enterprising traveller through lands hitherto unknown in Europe.—W. P.]

In the month of May, 1862 (says Señor Cox), I proceeded to Port Montt, on the bay of Reloncavi, with M. Lenglier, an intelligent young Frenchman, an *élève* of the Polytechnic School, to make the final arrangements for my journey across the Andes, and considered myself fortunate in being able to secure the services of Don Vicente Gomez, who in 1855 had reached Mount Esperanza, from whence he had obtained a distant view of the lake of Nahuel-Huapi. My party altogether numbered sixteen persons, nine of whom I engaged with Gomez to accompany me across the Cordilleras as far as the lake; the rest were to remain with me to the end of my expedition.

I had with me gutta-percha boats, several life-preservers, muskets and ammunition, carpenters' tools, and all that was requisite for the building of boats to navigate the lakes. My instruments were a barometer, two thermometers, a chronometer, and an instrument for taking altitudes; and lastly, though not the least important, as it proved, a guitar and flageolet to amuse the men in the evenings. Our stock of provisions consisted chiefly of roasted maize, charqui (prepared beef), flour, and salt, besides seventeen live goats and two sheep.

On the 7th December, 1862, I proceeded with my party on horseback to the lake of Llanquihué, which we were to cross in a boat sent up the river Maullin for the purpose. This is rather more than 200 English feet above the sea, and is the first of a remarkable chain of lakes situated one above the other in succession on the plateaux along the flanks of the Andes: its width is about 18 English miles, its length 24 or 25. The point at its extremity between the volcanoes of Osorno and Calbuco has been fixed at about 41° 12′ s. lat. and 72° 29′ w. long. from Greenwich. It is so deep that no bottom was found with a line of 200 fathoms. Crossing it from west to east on the evening of the 10th December, we landed at the foot of Mount Osorno, between which and Mount Calbuco a long marshy plain extends as far as the lake of Todos Santos.

On the 11th and 12th, whilst the peons went on with the baggage, I determined the heights of Mounts Osorno and Calbuco; the result in both cases being almost identical with those of Captain FitzRoy.

To the northward of our position lay a sterile plain, covered with black scoriæ, which Mr. Doll names in his map the Pass of Desolation. On the flanks of the mountain beyond, five extinct craters were distinctly visible. The last eruption of Osorno was in

1836 or 1837. All the trees on the low marshy land between the lakes of Llanquihué and Todos Santos are of very recent growth, suggesting the inference that the land is of recent formation, and that the two lakes perhaps not long since constituted only one, the separation being caused by some upheaval or current of lava flowing into them during an eruption of the neighbouring volcano.

On the 14th, leaving the shores of Llanquihué, we proceeded through the marshy levels between the two volcanoes till we reached the banks of the river Petrohué, which runs with great violence from the lake of Todos Santos into the bay of Reloncavi. Amongst other objects some basaltic columns here attracted our particular notice.

On the 15th we reached the shores of the lake of Todos Santos, where we had the good fortune to find a boat in tolerable preservation, which I had caused to be built there on a previous occasion when I had got so far in a vain attempt to cross the Cordillera. The aspect of this lake was melancholy enough from the sombre hue of the mountains which surround it. In the midst of it rose an island covered with forest trees, and beyond ran the road over the Cordillera. The silence of nature was only broken by the thundering noise of occasional avalanches from Mount Tronador in the far distance.

The 15th set in with rain and mist: the peons, however, brought up the rest of the baggage and the animals. These Chilians proved themselves capable of enduring extraordinary fatigue on a very small allowance of food: each carried a load of 75 lbs. Their morning meal before starting was seldom more than a handful of roasted corn mixed with water, and a second similar meal served their wants for the rest of the day. On the 19th, after three days of bad weather, I sent forward the greater part of the people in the boat, which, with my gutta perchas in tow, altogether made a very respectable little flotilla. They reached the eastern extremity of the lake without more serious accident than the loss of three of the goats. I joined them two days after, with the remainder of the party, at the mouth of the river Puella, where they had established their bivouac. This lake of Todos Santos is 706 English feet above the sea level: it is about 17 miles long and is shut in by mountains rising in peaks on all sides, of which Puntiagudo is the most remarkable, 5900 feet high, and covered with snow to its base.

On the 22nd Gomez volunteered to go on in advance with a party to reconnoitre the road leading to the Boquete, or Pass, which we were to cross, and which they reached in the course of the day, obtaining from it a distant view of Mount Tronador. He took with him the three carpenters, and sent them on to follow the pass to the lake, with orders to commence as soon as possible the building of the boat in which we were to commence our voyage of discovery.

On the following morning (December 23) the whole party started for the pass, each carrying his load. The day was magnificent. The lofty peak of the Techado lay on the left, and the River Puella was bubbling at our feet. Innumerable humming-birds were darting to and fro in quest of their food in every direction. On the 24th our march lay for some distance through a dense wood, and afterwards along the bed of the Puella, which in winter must be filled to overflowing, though at this season of December it was but an insignificant stream. We crossed it several times, the water reaching only to our knees: it was very cold, but the air was oppressively hot, 93½° in the shade. In the evening, after a march of about 6 or 7 miles, we encamped on the banks of a little stream, one of the sources of the Puella, at the entrance of Rozalez's Pass (the one we were in quest of), a break in the mountain-range, which it would have been very difficult to find without some previous knowledge of it. On the right Mount Tronador was thundering away, as if to salute us upon our arrival.

On the 25th, whilst the peons returned to their halting-place of the previous day to bring up the remainder of our baggage, I determined the height of the pass (Boquete), taking as a base the valley of the Puella: it was found to be 1098 feet above it. This, added to the 706 feet, the level of the lake of Todos Santos above the sea, and the 990 feet difference between that lake and the point to which we had ascended, and from which my observation was taken, gave in the whole 2794 feet as the height of the pass. Taking a larger base for measuring Mount Tronador, I determined its highest peak to be 9900 feet, more or less. I also endeavoured to fix the limit of perpetual snow, which, however, was not so easy a matter, in consequence of the time of year making it difficult to distinguish the perpetual from the winter snows. As far as I could determine the constant line, it was between 5280 and 5610 feet. Whilst so employed, to my extreme vexation, the carpenters, who I supposed were already at Lake Nahuel-Huapi building our boat, returned frightened, as it appeared, by the exaggerated tales of danger related by a companion, who had accompanied one of the former expeditions. To dispel the fears of the party, I saw there was no alternative but to lead the way myself, which I determined to do the following day. In the afternoon I visited Mount Tronador, from whose side the River Puella has its source. On the 26th we got the whole of the baggage transported across the bed of the torrent, a large tree being cut down and thrown over it for a bridge. The only difficulty here experienced was in getting the goats to pass it, for the leader, having turned tail, the rest of the flock ran off after him, occasioning considerable delay before we could catch them again.

We had now reached the commencement of the so-called Boquete, the latitude of which I fixed at 41° 9′, just twenty days after leaving Puerto Montt. The morning of the 27th opened with a glorious sunrise, and I led the way to the passage, accompanied by Gomez, the rest of the party following, with the exception of one man, who was left in charge of the goats very much against his inclination, and M. Lenglier, who remained to make a drawing of the pass. Following for a short distance the bed of the torrent we had crossed the day before, we proceeded in single file up a gentle ascent of about 25° through a forest of trees so dense as to hide the sky from our view, nor did we get sight of it again till we reached the top of the pass. The trunks of fallen trees and occasional ravines, which were easily crossed, proved the only impediments in our way, and in three hours the whole party had reached the level of the pass, where we found the vestiges of Dr. Fonk's former encampment in 1856.

From this point, by following the pass, we might at once have descended to the bed of the River Frio, which runs into the Lake of Nahuel-Huapi, but I declined to take this route from the uncertainty as to its being navigable for the gutta-percha boats without risk, and from the impossibility of following its course on foot in consequence of the perpendicular wall-like sides of the gorge through which it runs. I preferred to work our way over the mountains in a north-westerly direction straight for the lake. The ascent was very steep, and rendered more difficult by the bayonet-like icicles which hung from the trees through which we had to force our way. By two o'clock in the afternoon we had reached a small plain, covered with snow, where we halted for half an hour. The forest here was less dense, and there was more air. There was a still steeper rise above us to surmount, and the ground was so slippery from the snow that it was with great difficulty the peons were able to make any progress. They had to hold on by the branches of the trees, and literally to pull themselves up with their loads. At length we all reached the highest point, a level plain between the mountain of Esperanza and that called the "12th of February," covered with snow, and where vegetation had sensibly diminished.

From this point the prospect was most magnificent, at an elevation of about 4950 feet. Looking in the direction of the Valley of the Puella, I could clearly trace the line of the Boquete breaking through the Cordillera far beneath me. To the westward a portion of the lake of Todos Santos was visible, surrounded by mountain-peaks and bounded in the distance by the snow-

P 2

capped volcano of Osorno. Thick clouds covered Mount Calbuco. On my left rose Mount Tronador, enveloped in perpetual snow. At my feet were two rivers running in opposite directions; on the one side the River Puella towards the Pacific, and on the other the River Frio meandering through the plains below towards the Lake of Nahuel-Huapi, thence to be carried down the great River Negro to the Atlantic Ocean. In an opposite direction I looked down upon the Lake of the Guanacos, and in the farthest distance beyond I could see the deep blue waters of the Lake of Nahuel-Huapi glistening in the sun like one of the brightest of Nature's gems in the midst of the Andes.

At last, then, I had reached the eastern slopes of the Cordillera, and could see the way open by which I hoped to realise for the first time the possibility of crossing the continent, by almost continuous water-carriage from the Pacific to the Atlantic, the object and aim of my ardent aspirations for so many years.

From this spot, after crossing a plain covered with snow, in which some of the men sank up to their knees, we commenced our descent in the direction of the Lake of Huanacos, which is of a triangular shape, and situated between the mountains Esperanza and "12th February:" we found it covered with ice and snow, except a small open space, on which were some wild ducks. Following its left bank we reached the stream which drains it into the Lake of Nahuel-Huapi. Near this we halted and pitched our tent for the night, the people cutting down wood enough to make a blazing fire, which kept us all warm in spite of the snow by which we were surrounded and a rainy, bad night.

On the following day (Dec. 28) we recommenced our descent, crossed some levels covered with grass, and, passing some rather stiff ravines, came again upon the bed of the river which drains the Lake of Huanacos, and by 11 A.M. the whole party found themselves on the banks of the Lake of Nahuel-Huapi. In the afternoon I sent back the peons to the Puella, and set the carpenters to work in the woods to select timber fit for the construction of the boat in which we were to proceed on our voyage of discovery.

On the 29th they began their work in earnest, notwithstanding the rain which poured down incessantly. This western extremity of the lake is so walled in by the mountains which bound it on both sides that the sun can hardly reach it, and the consequence is a perpetual state of wet and damp; nothing can be more *triste*. On the 31st M. Lenglier arrived, but with only three of the peons, the rest having lagged behind in spite of all his remonstrances.

January 1, 1863.—No cessation of the rain, and an atmosphere most depressing; a bad beginning of the New Year. I was anxious with M. Lenglier to give the men some amusement in celebration of the day, but one of their own party, the man who had been left behind to take care of the goats, saved us that trouble by commencing a never-ending narrative, in justification of his alarm at having been left alone, of the wonderful pranks of the hobgoblins and spirits of the mountains amongst the poor woodsmen and others who venture into their domains. Whilst the carpenters worked hard at the boat I packed up the specimens of rocks and plants which I had collected, to be sent back by Gomez and the peons, who were to return to Puerto Montt. The provisions also for the voyage were laid out and repacked, chiefly consisting of roasted maize and dried beef (charqui), both of which are articles admirably adapted to meet the wants of travellers, especially when prepared and cooked by natives in their own fashion.

On the evening of the 3rd the boat was reported as ready for launching, the carpenters having worked unceasingly for six days to complete her. She measured 25 feet in length by 7 wide, very flat at the bottom, and intended not to draw more than 12 inches of water when afloat. We named her "the *Adventure*," with all due ceremony, amidst the cheers of the whole party and hearty wishes for her success. The guitar and flageolet provided abundance of merriment, in the absence of any better band of music; whilst the repeated echoes of a musket-shot amongst the surrounding rocks might well have been taken for a general salute upon the occasion.

We were to have embarked early on the morning of the 4th for the commencement of our voyage, but the weather delayed us till noon; in the mean time we had rather an affecting parting from Gomez and those of the peons who were to return to Puerto Montt. They had shared our toils and troubles very cheerfully, and we took leave of each other with the most kindly feelings. Who knew whether we should ever meet again! We got off about midday, the party consisting of myself and Mr. Lenglier, the carpenters, Mansilla, who was to act as steersman, and four men at the oars: seven persons in all.

We very soon found that we were overloaded and the cargo badly stowed; to make matters worse, as we advanced into the lake the wind rose and the waters became so agitated that twice they broke over the prow; we lost also our rudder, and but for the promptness with which Mansilla seized one of the oars to steer, we should have been driven upon the rocks. The sleet fell thick, and we suffered greatly from cold before we could find any place of safety to run into for the night; there we made a fire, cooked our supper, and laid down in our rugs to sleep as best we could.

The weather improving on the 5th we set to work to rearrange our stowage, and to lighten it by transferring some of the provisions to two of the gutta-percha boats, which we then fastened together, and took in tow. The wind being fair, we hoisted our sail and held our course for the island (named Saint Pedro on the map), and which bounds the long narrow reach at the western extremity of the lake we had passed through. On emerging from this we had on our left a deep bay studded with islands, the largest of which we named *Isla Larga;* it was covered with verdure, and had a very different aspect from the rugged sides of the mountains we had just left.

In crossing it a puff of wind caught us, the gutta-percha boats filled with water, and we had but just time, before they sank, to save them by running into a small cove upon the island. By this accident we lost several bags of flour and charqui. After repairing damages as well as we could, we coasted along the northern side of the lake which trends eastward, and landed in a rather considerable bay, to which we gave the name of Port Venado, from an animal of the deer kind which we saw on the shore, and afterwards gave chase to without success. We were now fast leaving behind us the close damp atmosphere of that part of the lake which lies embedded in the mountains, and were entering a region possessing a much more clear and healthy climate. The vegetation also assumed a different aspect, and the ground appeared covered with thousands of flowers in every variety of colour. We all felt that we breathed more freely, and greatly enjoyed our run on shore. Looking from hence towards the southern side of the lake, where the Cordillera gradually falls off in gentle undulations, and before its entire termination in the Pampas beyond, we observed a very remarkable and decided break in the range. I asked myself, May not this be the entrance of that *Pass of Bariloche* which the first missionaries used in their journies to and from Chiloe, and which they performed in the short space of three days? I have strong grounds for believing that it was; in which persuasion I was subsequently confirmed by a Pehuenche Indian, who told me that every year the Indians resorted to that part of the lake to collect stray cattle, and that he himself had taken no less than 50 beasts there, all of which were marked with the owner's brand. These cattle must have strayed from the herds of the German colonists, whose grazing grounds extend to the foot of the Cordillera, from whence they had doubtless escaped through the pass in question, and which probably was in the direction marked on the map.*

In rounding the furthermost point of Port Venado the wind

* In a map of the coast drawn in 1792 for the Viceroy of Peru, by Moraledad, the *entrance* to the Pass of Bariloche is described as near the mouth of the River Petrohué, which runs into the Bay of Reloncavi from the Lake of Todos Santos, and which is stated in a note to be the pass by which the missionaries travelled from Chiloë to the Lake of Nahuel-Huapi.

freshened, and our gutta-percha boats were a second time submerged, obliging us again to make for the shore; where we determind to wait till sunset, when we had now learnt from experience that the wind generally moderated. Whilst the peons were engaged in spreading out our damaged provisions in the sun to dry, I took the opportunity of adding largely to my herbarium. At 7 in the evening we once more got under weigh, this time without the gutta-perchas in tow—they were, in fact, no longer required after the loss of the provisions with which we had first loaded them, and which had made a sensible diminution of our cargo. A gentle breeze favoured us, the moon rose splendidly, and we made considerable progress on our voyage, continuing our course along the northern shores of the lake. Believing, however, that we could not be very far distant from its eastern extremity, I thought it prudent once more to land the party, and give them some rest for whatever fresh efforts might be required to make next day.

Jan. 6.—The morning broke upon us with a glorious sunrise, and Mansilla, our pilot, drew my attention to a long stream of mist rising from the plain in the far east, which he felt satisfied must be caused by some river running out of the lake in that direction: there seemed, indeed, every reason to think he was right, and great was the excitement of the whole party in consequence. Not to leave the matter in doubt, I sent forward one of the men, Soto by name, who volunteered to walk to the spot.

It was, however, necessary in this to use some caution, as we had found evidences where we landed of the Indians having been lately there: the remains of their fires and tracks of their horses proved that their visit was recent. Nothing daunted by this, however, Soto started. All eyes were on the look out for him, and great was the rejoicing when he returned with a full confirmation of the fact that we were close to the entrance of the River Limay—for that it was the Limay we had no doubt. I proceeded at once with Lenglier to verify it; nor could I restrain the rest of the party from following us. After a walk of little more than three miles in a most broiling sun along the shores of the lake, we reached a point near which the stream ran somewhat rapidly out of it in a northerly direction. There was no apparent impediment to its entrance, and before the day was over we had moored our little vessel safely within it. The men were in great glee and delighted with their walk, in the course of which they filled their caps with wild strawberries, which was a great treat.

I wandered with Lenglier till dark in the vicinity of the river, and at no great distance from it determined, as I believed, the site of the old establishment of the missionaries (which was afterwards confirmed by accounts I received from the Indians). We had thus successfully traversed the whole length of the lake of Nahuel-Huapi from west to east, a distance I calculated of about 40 miles —its average breadth may be from 12 to 15—and were about to enter upon the exploration of the River Limay, all that remained to connect our discoveries with those of Villarino, who had verified its junction with the great River Negro in 1782.

Success had so far crowned our efforts; but I felt that the descent of an unknown river, perhaps beset by rocks and snags, was a very different matter to the navigation of the broad and open lake we had traversed; albeit even that had not been effected without disaster. I determined to give the men a good supper, and ordered our last goat to be killed; the others had been already despatched and salted. We had a merry evening, and laid down to rest for our labours next day.

Jan. 7.—As may be supposed, we were all up early and busily engaged in preparing for our start. The bags of provisions were carefully re-stowed and the gutta-percha boats packed well away under the seats, with their tubes inflated to help to float us in case of accident. As we had now to trust only to our oars we set up our mast upon the shore, with a bottle attached to it enclosing a list of our party and the date of our arrival so far on our way. By 7 A.M. all was ready: each man had fastened on his life-preserver, Mansilla took his station at the helm, four men at their oars and one in the bow to look out for dangers ahead, whilst I myself, compass in hand, took my seat with Lenglier astern to give whatever orders were requisite, and to note down such observations as we could in our passage down the river. Three lusty cheers, and we were off. For some distance we found the river considerably agitated—the natural consequence of such a body of water rushing from the lake through a comparatively narrow channel; but as we advanced it became more and more placid and the stream less rapid. The water was very clear and we could see, at a depth of 3 or 4 feet, the bottom strewed with large boulders. Its width might be about 80 yards, and the current about 7 miles an hour. The course of the river was, with little variation, nearly due north. We passed some islands covered with bright-looking shrubs, and proceeded without accident till about 10 o'clock, when we arrived at a long wide bend in the river. We ought to have followed this with the stream; but, to save distance, we unfortunately endeavoured to row across it, and ran aground in shallow water, springing a leak in our bottom. We were able, however, without much difficulty to haul the boat ashore, and being sufficiently provided against such accidents, repaired the damage. In little more than a couple of hours we were again afloat; but it was hard work for the carpenters under a suffocating heat, and mosquitoes enough to drive us all mad. I was myself also under some apprehension lest the noise of our hammers might at any moment bring down upon us the Indians, whose lands we were now traversing. For an hour after there was little variation in the force of the current or the uniformity of its bed; but it then became divided into three or four distinct channels, with little apparently to choose between them: unluckily we followed one in which the water suddenly shallowed, and we again ran aground. Instinctively the men all jumped out to lighten the boat, and dragged her by main force into a deeper part of the stream. But we had hardly taken our places again when we found ourselves in the midst of other perils: instead of the low loamy banks which so far had bounded the river, steep rocks now rose on either side, between which the course of the stream became very winding; and though the current and deepest water followed the bends, we found them so beset with rocks that we thought it safer to cut across them and make our way through the shallows by force of rowing wherever we could. In this manner we passed several rapids, and had some very narrow escapes. About four o'clock in the afternoon our situation had become very critical: the bed of the river was much narrower, and studded with rocks. It seemed a miracle that we passed safely through them and over a formidable rapid beyond, which nothing but an almost superhuman effort on the part of our oarsmen could have pulled us through. This danger passed, I ran the boat into a small cove in a bed of the river and landed to obtain a short respite from our labours.

It perhaps may be asked why, before proceeding further, we did not make some effort to reconnoitre the course of the river from its banks, in order to ascertain the practicability of the further passage down it. But I knew we were now in the territories of the Indians, and I was unwilling to leave the river lest they should fall in with us: we were on foot and without any means of avoiding them had they discovered us. Besides, the distance which remained for us to accomplish before reaching the River Negro was very small, for I calculated we had gone 75 miles since the morning, and were, therefore, close to the point which Villarino had reached from the Negro without any impediment so far. There seemed no ground for anticipating any fresh difficulty.

We therefore once more launched into the stream, which for a short distance though rapid was smooth, and we glided down it with tolerable security, till on rounding a point about half an hour afterwards we beheld to our dismay the whole river before us as one foaming torrent, boiling with whirlpools, and breakers bursting over rocks in all directions. We made a violent effort once more to gain the land, but in vain; the strength of the current carried us into the midst of the stream, by which we were hurried along, our frail bark no longer obeying the helm, and the oarsmen rendered powerless even to keep her head on. She was carried sideways down the rapid, and striking a sunken rock, at once filled with water and was instantly turned completely upside down. From my own position with Lenglier in the boat, we fell under her when she was capsized, caught as it were in a trap. My life-preserver caused me to rise, but it was only to knock my head against the inside of the boat; fortunately she drifted a little, which set us free, and I struck out for the shore, which I succeeded in reaching and climbed up by some boughs overhanging the river-side. Lenglier and the men managed to get upon the boat's bottom, where they remained till she was carried some distance further down and became firmly fixed between two rocks, when they also managed to reach the shore. The river here was about 80 yards wide. As soon as the men were able to think of anything they set to work to collect whatever was washed ashore from the wreck, in which we were more fortunate than might have been expected under the circumstances. Some of the bags of flour and charqui, and a tin-case containing chocolate, relieved me of any anxiety as to the supply of our immediate wants. My knapsack also, and that of Lenglier, containing some useful articles, were saved, and with them a copper matchbox, which had fortunately proved water-tight and furnished the means of lighting a fire at once, which of all things we most needed, thoroughly drenched as we were, and shivering under the cutting wind from the Cordillera. Nor must I forget the bag containing my guitar and flageolet, the preservation of which proved in the sequel of more importance than could have been imagined. My companions, now completely exhausted, were soon asleep round the fire; but I could think of nothing but the bitter disappointment of my hope of reaching the Negro when almost in sight of it. However I could not but be thankful for our preservation, and that we had accomplished so much.

Jan. 8.—At daybreak we renewed our search along shore for such articles as might have drifted there from our unfortunate boat, which Mansilla and two or three of the men contrived to reach and found firmly fixed in the same position as the evening before. Mounting upon the keel, however, they broke open her bottom and were able to get out several bags of provisions, the carpenters' tools, the case with my papers, some portion of the gutta-percha boats no longer serviceable, and sundry minor articles which had been packed in the seats, amongst which, luckily, were some beads and toys for the Indians, which did us good service afterwards. Whilst we were thus busily engaged we were startled by the appearance of two Indians on horseback, whose look of stupid amazement at the unexpected discovery of a party of strangers in such a place I shall not easily forget. I went forward at once to meet them, and they dismounted. The only Indian word I could recollect with which to address them was "*Peni*—brother." They answered, "*Peni.*" I led them to our bivouac and gave them some flour and charqui, the latter of which they ate with evident gusto. I mentioned the name of Llanquitré, a cacique who had formerly lived in those parts; whereat they expressed considerable surprise, and began talking to each other, and soon after expressed by signs their wishes that I should accompany them to the tents of Paillacan, their cacique. I replied, in the same manner, that I would do so as soon as we had finished collecting the *débris* of the wreck; whereupon they sat down to watch our proceedings, every now and then breaking out in expressions apparently of commiseration for our misfortune. It was some satisfaction to me that they seemed disposed to show rather a kindly feeling than otherwise for us in our distress, since it was manifest that now we had no alternative but to trust ourselves to their guidance to enable us either to recross the Andes, or to find our way through the Pampas to the settlements of Buenos Ayres.

Dividing amongst the men the provisions and such of the articles we had saved as I thought might propitiate our new acquaintances, we bade adieu to the last remains of our hapless "*Adventure*" and prepared to follow our dusky leaders. They had with them two spare horses, on the bare back of one of which they persuaded me to mount. Lenglier preferred walking, and gave up the other animal to Vera, one of the men who had hurt his foot in escaping from the wreck. I had nothing on but my shirt and trousers, with a kind of turban to protect my head from the sun, which I had made out of the green bag in which I had kept my guitar. As soon as I was mounted the Indians were impatient to be off, and began to manifest considerable disgust at the slow pace of the party on foot. As we went along the river-side I was enabled to observe that the stream had resumed its ordinary regularity: there seemed to be an end of the rocks, which were replaced by small islands covered with low shrubs, between which the current appeared to run so smoothly as greatly to aggravate my regrets that we had failed in passing further down. In all probability it would have been perfectly practicable some months later in the year, when, as Villarino found, these rivers become swollen by the periodical rains.*

On reaching a small rivulet, which crossed our path, the Indians dismounted to make a meal of some of the flour I had given them. Their cookery was simple enough; throwing a handful of flour into

* Villarino entered the same river, the Rio Encarnacion (as he named it), on the 25th March, at which period he found it at its lowest, though with about 5 feet water as far as he went up. Upon his return from the Catapuliche (the opposite river), early in May, the waters had risen so much after the rains, that every rapid he had met with in going up the River Negro had disappeared in one broad and deep stream, which carried him in three weeks a distance which had required six months to surmount against the current in the dry season.

a piece of raw hide, they poured upon it some water, which they stirred up with their fingers till it became a paste fit for eating. This gave time for the party on foot to come up with us, and Lenglier, who was an inveterate smoker himself, offered them some tobacco, but found to his surprise that they had no notion of using it. After a short rest a little further on, the elder of my guides left us, and galloped on, as far as I could understand, to give notice of our coming. The only incident which broke the monotony of our silent journey was the rush past us of a herd of guanacoes, startled at our approach, and scared by the shouts of my companion. At last we came in sight of some yellow tents in the distance, and a man in the garb of a Spaniard galloping up addressed me in that language, saying he was sent to conduct me to the cacique who was expecting me; and adding, for my comfort, that I had the bad luck to have fallen into the hands of one of the greatest brutes of all the Pampa tribes. On reaching the tents I was surrounded by a group of women and children, who stared at me in stupid astonishment. No time was lost in ushering me into the presence of old Paillacan, the most villanous-looking savage I ever beheld. He was evidently half-intoxicated; his long dishevelled hair hung about his ears, and his eyes were red from drinking, and glared like those of a wild beast. He received me in the rudest manner, refusing to shake hands with me, and assuming altogether such a threatening attitude that I was taken quite aback. Making the Spaniard sit down to interpret, he began a long-winded discourse in a highly excited and angry tone; the upshot of which was to ask me, how I, a Chilian, had dared to come into the lands of the Indians without their special leave, and whether I was not aware that he might put me to death for such a piece of audacity. The length of his speech fortunately gave me time to recover from my first impressions, and to consider my reply, which, knowing the hatred and jealousy of these people towards all Spaniards, I began by saying I was not a Chilian, but an Englishman travelling from that country on a matter of business to Buenos Ayres: that I had come down the River Limay hoping to reach the Negro, which I understood was the shortest way there; that I had not come as an enemy, but as a friend, loaded with presents for himself and any of the caciques of the Pampas I might meet with; that he must have heard from his own people of the wreck of my boat, in which I had lost the presents with everything else belonging to me, but that, if he had seen them, he would have been satisfied with my generosity. Then opening my knapsack I took out some of the strings of beads and other trifles which I had taken care to bring with me. I said that, though these were trifles, they would prove to him the truth of what I had told him, and that I had not come empty-handed. I now trusted, I said, to his help to enable me to continue my journey, at least to Carmen on the River Negro; which, if he would promise me, it was my intention first to go back across the Cordillera to Valdivia to get what I wanted for myself, and to purchase for him and his family such presents as would delight him to his heart's content. As I proceeded I watched with some anxiety the countenance of the old savage, and was not a little relieved to see it gradually exhibiting more and more symptoms of humanity as I raised my voice to dilate upon the importance of the presents I intended for him. He seized upon the beads and fillets which I had produced, and commenced distributing them amongst the women and children about him; who in their joy became excessively noisy and uproarious. In this confusion the happy idea occurred to me of giving them a tune on my flageolet. The effect upon the whole party was instantaneous: old Paillacan took the instrument into his own hands, and was as pleased as a child when he found he could make a noise with it. I saw that I had nothing more to fear; the flageolet had settled the business. A young Spaniard, Argomedo by name, who told me he had been seized by Paillacan on returning with some Indians to Chili from the settlement of Carmen, and was kept to wait upon him and his wives, brought me some horseflesh for my supper, and afterwards gave me half his bed—a dry hide covered with sheepskin. He said it was fortunate for me that I had found the cacique alone, his people being out on a hunting excursion beyond the River Negro; had they been at home, he said, I should have had them all to deal with and to satisfy.

Jan. 9.—At daybreak I was summoned to a formal conference by Paillacan, whom I found in a much more sober state than the day before. After a long dissertation on the exclusive rights of the Indians to the territories I had passed through, he said he had been considering well what I had told him, and had come to the determination to forgive my offence in entering his lands without leave, upon condition of my proceeding at once to Valdivia to bring him the presents I promised him, and that on my return with them he would allow me to accompany some of his people to Carmen, who were going there to sell skins. He insisted, however, on my leaving two of my people with him in the mean time as hostages for my coming back; and ended by making me swear by the Sun that I would faithfully perform all I had promised him. The son of Paillacan, Quintunahuel, who had returned in a state of beastly intoxication the day before from a drunken bout with another tribe, was no sooner apprised of the compact his father had made with me, than he sent for me to beg I would not omit to bring some suitable present for him also, the rather as he proposed accompanying me himself to Carmen. But of all these beggars the worst was Paillacan's head wife, Pascuala, a Tehuelche Indian, born near Carmen, who spoke Spanish, and was incessant in her importunities for the articles we had saved from the wreck; and, when I had no more to give her, in asking me to bring her everything she could think of on my return from Valdivia. I was obliged to satisfy her as well as I could in order to be sure of getting anything to eat, for I was soon made aware that she was sole controller of Paillacan's household.

Jan. 10.—About noon Lenglier made his appearance with the rest of our party, whose non-arrival the day before caused me no little anxiety. It appeared that after I left him he had lost our track, and, in doubt which way to turn, had gone back to the wreck, where he was found by Paillacan's people, who had been sent in quest of them. It was fortunate he did so, for it enabled him to recover some further articles which had been washed ashore from the boat; which proved very acceptable in our condition, not only for our own use, but as gifts to the Indians; especially a bundle of blankets, and two more bags of flour very little spoiled. I would have started the same day, but the peons were too tired, and I was obliged to wait till the next.

Jan. 11.—In the morning we were again delayed in consequence of the guides who were to accompany us not having recovered from the effects of a drinking bout with old Paillacan the night before. About noon, however, we got off; two of the peons having volunteered to remain till I came back. Mansilla and the two remaining peons walked on foot, their clothes in tatters; I and Lenglier were on horseback, fortunate to have blankets for our saddles, which at night might serve us as bedding. The only provisions we started with consisted of what flour we had been able to save from the rapacity of our late hostess Pascuala, and a sheep which she gave us at parting, upon my promise that she should be amply repaid for her generosity on my return. And so we left old Paillacan's camp at Lali-cura, as it was named. The happiest individual amongst us perhaps was Argomedo, the young Spaniard I have already mentioned, whose liberation I succeeded in obtaining, and who was but too glad to be allowed to join us on his way home.

Our road onwards ran through a long plain intersected by the River Caleufù, which we had to cross where the water was breast high. Towards evening we arrived at the camp of the cacique Huincahuel, very pleasantly situated in a fertile valley full of rich pasturage. This cacique gave me a very different reception from old Paillacan's, conducting me at once to his own tent, and treating me with all the hospitality in his power. His tribe is much more numerous than that of Paillacan, and I was agreeably surprised to find how many of his people could speak Spanish more or less. Here, too, for the first time, I saw Indian women at work sewing, with a cobbler's awl for a needle and the sinews of ostriches and horses for threads, and yet with these materials their work was neat and pretty. The cacique himself was under some excitement in consequence of the arrival of a messenger from the authorities of Buenos Ayres with an invitation to the tribes to send deputies to Carmen on the River Negro to treat for the terms of a general peace. From this man, who had come from Carmen, I obtained some useful information as to the intervening country. We were here not far from the River Chimchuin, which Villarino calls the Huechum or Catapuliche, the northern affluent of the River Negro, which he ascended for some distance. I found, upon inquiry, that some of the people of this tribe had a traditionary remembrance of his visit to those parts, as they said, in boats, with big guns, and very hard bread (biscuits) to eat.

Jan. 12.—As the Peons travelled more slowly on foot, I sent them on at daybreak, remaining myself a few hours longer with Huincahuel, who had begged me to write a letter for him to the Judge of Quinchilla in Chili, regarding one of his men who had got into difficulty for stealing a horse. I parted with this cacique with the most favourable impressions as to his real wish to be on the best terms with his Christian neighbours.

Our way now was towards the Cordillera, and we began to find, in consequence, a sensible difference in the temperature. Our only halt this day was on the River Quem-quem-tru, where we rested for an hour, and then went on till nightfall, when we reached a plantation of maize, beans, and potatoes, the property of a rich Indian, Antinao by name, whose tents our guides told us were some little way further on. There we laid down for the night under some wild apple-trees. Our peons had missed us on the road, and, as we found afterwards, had gone on to Antinao's camp, where he treated them so well that they got as drunk as the Indians, and so drunk as to promise him that if I would leave them with him till my return from Valdivia, they would build him a wooden house like those in Chili,—the great object of his ambition. Finding them in the same humour next day, when we came up with them, I made no objection; and so our party was again diminished by two more of our men, Lenglier and one of the peons only being left with me, besides the young Spaniard, Argomedo.

Jan. 13.—We had not gone far beyond Antinao's tents, when we found ourselves suddenly surrounded by a party of about fifty Indians, armed with lances and swords, who insisted upon our going with them to an encampment in the vicinity, where their caciques they said were already holding a conference respecting us, having had notice of our approach, as I heard afterwards, from a mischievous rascal with whom I had had some dispute, and who in revenge had stirred up these Indians to annoy us. The display of force was the most formidable we had witnessed amongst these people, and might have alarmed us for our safety if we had not now had some experience of their manœuvrings. The caciques received us with their usual pompous gravity, and, sending for an interpreter, began a long and tiresome harangue, and questions as to the motives of our journey, and the presents I had brought. In fact it was a repetition of the old story, and an attempt to intimidate and to get from us whatever they could. We escaped at last with the sacrifice of nearly everything we had left. They carried off our blankets, which we had left under Argomedo's care during the conference, and stole Lenglier's hat, which I only wondered he had kept so long, for it had been an object of envy with every Indian who had seen it, and with difficulty had been saved from the clutches of old Paillacan. We consoled ourselves, however, with knowing that we were now fast approaching the Chilian boundary, where our losses could be easily replaced. This was our last adventure worth mentioning with the Indians.

Soon after, we found ourselves fairly in the Cordillera, and passing the Cerro Trumbal, wended our way along the northern shores of the Lake Lacar (the waters of which run towards the Pacific), and where we established our bivouac for the night. (This lake is 1749 feet above the sea, and 15 or 16 miles in length, by 3 or 4 wide.)

In this part of the Cordillera of the Andes the "Linea divisoria," or parting of the waters, leaving its general direction north and south, makes a great bend or inflection to the eastward, of nearly 50 miles, with a remarkable depression, encircling the great lake of Lacar, which, although thus in appearance situated on the eastern side of the range, in reality discharges its waters into the Pacific. Nevertheless, its eastern extremity is not more than 12 or 15 miles from the sources of some of the tributaries of the Atlantic. The Lake of Lacar is united with the Lake of Perihuico, which latter is drained by the River Callitué, which falls into the Shoshuenco from the north. Both these run together into the Lake of Rinihué, the drain of which is the River of Valdivia. It is stated upon undoubted authority that three Indians, who had crossed the Andes from Valdivia, finding upon their return the Passes blocked up by snow, managed to reach on horseback the Lake of Perihuico, where, building a canoe, they passed down the River Callitué into the Lake of Rinihué, to the astonishment of the people of Valdivia, who at first would hardly believe in the possibility of opening such a communication.

The next day, the 14th, we passed through a tract of forest, at the end of which stand the ruins of an old Spanish fort. We reached a river, over which we were ferried in a canoe, the horses swimming across it, and, coasting the small Lake of Queni (1854 feet above the sea) about eight in the evening, reached the beginning of the Pass of Ranco, or Lifen, over the Andes, where we halted for the night, but could get little sleep for the cold.

On the 15th we effected the passage with some difficulty. The highest point is 2760 feet above the sea, as I ascertained on my subsequent return over it. This was the pass by which Villarino had hoped to reach Valdivia; it is only passable four months in the year. The descent on the Chilian side was very steep, and slippery from the snow, and obstructed by fallen trees, which made it the more difficult. I afterwards dismounted and walked on till we halted for the night at the house of a Christian Indian, where we were kindly taken in, and got a supper of boiled beans, which to us seemed a delicious repast. On the 19th I entered Valdivia, just forty days after we had started from Puerto Montt.

In the month following it appears that Don Guillermo Cox again started, in fulfilment of his promise, loaded with presents for the Indians, and especially for old Paillacan, on whom he principally relied to enable him to prosecute his journey to Carmen. But after passing about six weeks in exploring that part of the Andes which is situated opposite to Valdivia, and in visiting the tribes located on their eastern slopes, by whom he was in general kindly received, he was suddenly obliged to retrace his steps, in consequence of an unexpected outbreak against him on the part of some of the most influential of the caciques of the Pampas beyond, who had come to the determination to use force if necessary to prevent his proceeding through their lands. The work he has since published in Chili,* and of which he has sent a copy to the Geographical Society, contains full details of very great interest, not only regarding the physical geography of that part of the Andes, but as to the habits and customs of the Indians, which he had ample means of studying during his stay amongst them. So far from being discouraged, Señor Cox, in a letter to Sir Woodbine Parish, expresses his determination to renew his attempt to pass down the River Negro, and so carry out his first intention; and should he succeed in this, he says he shall not rest till he has explored the whole length, as well as breadth, of Patagonia, to the Straits of Magellan.

In the mean time Señor Cox is strenuous in urging upon the

* 'Viage en las Regiones Septentrionales de la Patagonia 1862-1863,' por Guillermo Cox. Con un Mapa. Santiago de Chile: Imprenta Nacional, Nov. 1863.

Chilian Government the importance of verifying and reopening the old Pass of Bariloche, by which the Jesuits in three days were able to reach the Lake of Nahuel-Huapi from the coast, and of extending the German settlements of Port Montt to the borders of that lake, which by good management he believes may be made the means of establishing friendly relations with the Indians, which would soon be found mutually beneficial. In connexion with such a settlement at Nahuel-Huapi, he points out the facilities it would offer for the re-establishment of a mission, for the express object of reducing the Indians to Christianity, to which he believes they will now be found by no means so disinclined as may be imagined. The Christian women amongst them who have been made captives in their wars with the Buenos Ayreans, are always held in particular estimation, and seem to have taught their masters to regard baptism as an honourable distinction.

XV.—*Details of a Journey through part of the Salado Valley, and across some of the Argentine Provinces.* By THOMAS J. HUTCHINSON, F.R.G.S., &c., H.B.M.'s Consul for Rosario. (Communicated through the Foreign Office.)

Read, May 9, 1864.

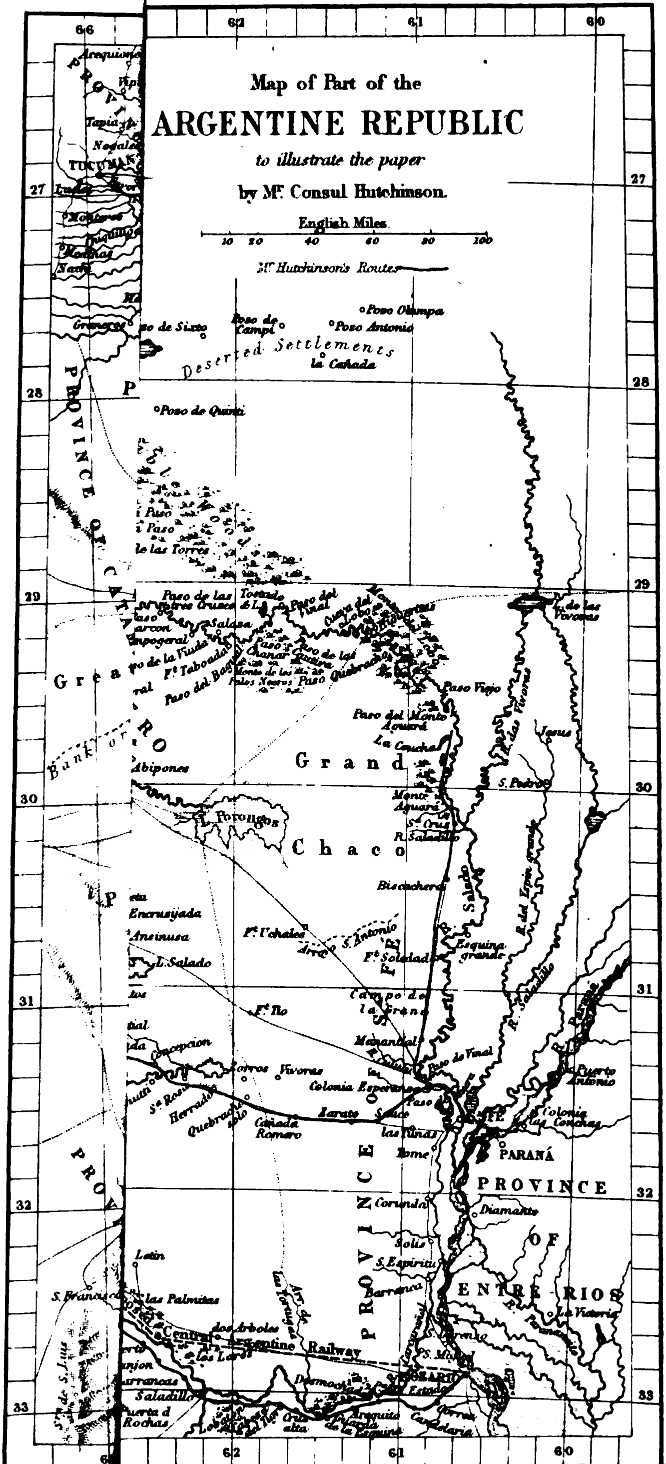
THE Rio de la Plata to the south, and the Amazons towards the north, constitute the aortas of navigation in the South American Continent. Of these the former seems to me the more important in a practical point of view, chiefly because flowing, for the greater part of its course, outside the southern tropic, through the most salubrious country, and the richest virgin soil, its advantages deserve to be known to the European immigrant and capitalist.

The Plata, with its tributaries, has been well and ably described since its discovery by Don Juan de Solis, in A.D. 1515. With the excellent map of Sir Woodbine Parish, the surveys of Commander Sullivan, R.N., published by the Admiralty, and the extensive chart of Captain Page, U.S.N., attached to his book, it might seem that nothing remained to be described. But having visited certain parts, not touched at by either of these gentlemen, particularly in the Upper Salado district, I hope to be able to add a mite or two of information in reference to some as yet but partially known localities of the Argentine Republic.

Twenty-four miles above Buenos Ayres, which is 200 miles distant from the embouchure of 150 miles wide between Points

Edwd. Weller

Published for the Journal of the Royal Geographical Society, by J. Murray Albemarle Street, London 1864.



J. Murray Albemarle Street. London. 1864.

Edwd. Weller

Saint Mary and Saint Catherine, the Plata is first formed by the confluence of the rivers "Paraná" and "Uruguay," the former in the lowest part of its course dividing the province of Entre Rios from that of Buenos Ayres, and the latter separating, in the like part of its stream, the province of Entre Rios from the Uruguay or Banda Oriental Republic.

Here we enter into the River Paraná, and here, too, we find the base of that delta described by Captain Page as stretching across in a line from the mouth of the little River Tigre, in the province of Buenos Ayres, to that of the Paraná branch, called the Brazo de la Mini, which falls into the Uruguay at a distance of 40 miles.*

The apex of this delta terminates, according to the same authority, at Diamante, in Entre Rios, a distance in right line from its base of 178 miles, and by the navigable course of the river of 245 miles. Several of the channels comprised in this delta are passable for vessels, as the Paraná Guazú, Las Palmas, the Arroyo Capitan, and the Baradero. These flow directly into the River Plate, whilst the Brazo Largo, Brazo Brano, Parbon, Paranà cito, and Brazo de la Mini, run in a more easterly direction, and fall into the Uruguay, before it reaches the point whence the confluence of both rivers forms the La Plata.

Ascending the Paraná, we pass the towns of Zarate, San Pedro, San Nicolas, Villa Constitucion, and Rosario, all on the south-western or Buenos Ayrean side of the river. This, from Rosario, for about 15 leagues upwards, presents no feature of importance, [illegible]ave about midway of that distance the convent of San Carlos at [illegible]an Lorenzo on its right bank. Islands having no vegetation, [illegible]ve the dense scrubby bush and grass with which they are covered, [illegible]ound everywhere.

[illegible]pproaching Diamante, we come in view of the undulating land [illegible]ntre Rios province, very pleasing from its contrast to the flat [illegible]passed by all the way up from Monte Video, but having the [illegible]e appearance presented everywhere by uncultivated soil. [illegible]een Diamante and Santa Fé, but on the opposite side to [illegible] we pass the mouth of the Northern† Salado River, in [illegible]″ s.; long. 60° 39′ 40″ w.

[illegible] little or nothing was known previous to the [illegible]in Page, whose surveys extended through [illegible]aguay territories from 1853 to 1856. He [illegible] Aguara—a distance by river course of [illegible]steamer *Yerba*, and touched at other

[illegible] Page, U.S.N., p. 65.

[illegible]n Salado, which flows through Buenos

Saint Mary and Saint Catherine, the Plata is first formed by the confluence of the rivers "Paraná" and "Uruguay," the former in the lowest part of its course dividing the province of Entre Rios from that of Buenos Ayres, and the latter separating, in the like part of its stream, the province of Entre Rios from the Uruguay or Banda Oriental Republic.

Here we enter into the River Paraná, and here, too, we find the base of that delta described by Captain Page as stretching across in a line from the mouth of the little River Tigre, in the province of Buenos Ayres, to that of the Paraná branch, called the Brazo de la Mini, which falls into the Uruguay at a distance of 40 miles.*

The apex of this delta terminates, according to the same authority, at Diamante, in Entre Rios, a distance in right line from its base of 178 miles, and by the navigable course of the river of 245 miles. Several of the channels comprised in this delta are passable for vessels, as the Paraná Guazú, Las Palmas, the Arroyo Capitan, and the Baradero. These flow directly into the River Plate, whilst the Brazo Largo, Brazo Brano, Parhon, Paranà cito, and Brazo de la Mini, run in a more easterly direction, and fall into the Uruguay, before it reaches the point whence the confluence of both rivers forms the La Plata.

Ascending the Paraná, we pass the towns of Zarate, San Pedro, San Nicolas, Villa Constitucion, and Rosario, all on the south-western or Buenos Ayrean side of the river. This, from Rosario, for about 15 leagues upwards, presents no feature of importance, save about midway of that distance the convent of San Carlos at San Lorenzo on its right bank. Islands having no vegetation, save the dense scrubby bush and grass with which they are covered, abound everywhere.

Approaching Diamante, we come in view of the undulating land of Entre Rios province, very pleasing from its contrast to the flat land passed by all the way up from Monte Video, but having the desolate appearance presented everywhere by uncultivated soil.

Between Diamante and Santa Fé, but on the opposite side to the former, we pass the mouth of the Northern † Salado River, in lat. 31° 38′ 34″ s.; long. 60° 39′ 40″ w.

Of this river little or nothing was known previous to the exploration of Captain Page, whose surveys extended through the La Plata and Paraguay territories from 1853 to 1856. He went up as far as Monte Aguara—a distance by river course of 340 miles—in the little steamer *Yerba*, and touched at other

* Vide 'La Plata,' &c., by Thomas Page, U.S.N., p. 65.

† Styled so in opposition to the Southern Saladó, which flows through Buenos Ayres province.

points of the river higher up, during an overland voyage through the provinces of Santiago and Salta.

General Don Antonio Taboada crossed the Chaco by the banks of this river in 1856, making observations of sites whereon to erect fortresses for the purpose of keeping off the Indians. In the subsequent year its exploration was commenced (for the practical purpose of ascertaining its navigability) by Don Estevan Rams y Rubert; and Señor Rams's examinations having had, in the year 1858, the advantages of the engineering skill of Mr. John Coghlan, C.E., of Buenos Ayres, that gentleman ascertained that it could be made navigable with some expense, as far as Sepulturas in Santiago Province. Captain Page, although not having examined it, as he says, "with the critical eye of an engineer," had pronounced the possibility of its navigability to a distance of nearly 1000 miles above Santa Fé, or, in fact, more than 1500 miles from the mouth of La Plata.

About 30 leagues to the northward of Santa Fé, there flows into the Paraná, from the north-eastern Chaco, the Arroyo San Xavier. Between this last-named and Santa Fé exists an immense lake, the Laguna Guadaloupe. This laguna extends parallel to the course of the Paraná for more than 20 leagues. Its greatest width is not more than 5 leagues. The neighbourhood of San Xavier is where stood the original city of Santa Fé, changed to its present site, according to Sir Woodbine Parish, in the year 1651.

Between the Salados mouth, near Santa Fé, and the colony of Esperanza (a distance by river course of 48 miles), we have the Paso de St. Thomas, the Paso de San José, the Paso de Coronda (which is crossed by a wooden bridge that gives access to the diligencia and carriage road to Rosario), the Paso de la Piedra, and the Paso de Miura. This last-named is where the road leads from Santa Fé to Esperanza; the colonists and other passengers crossing here, with their carts or horses, by two floating barges, styled "chatas." Opposite to Esperanza is the Paso de Vinal, in the Salado, where they are contemplating to construct the harbour for the colony.

Our journey in the Chaco was from Esperanza across the Cululu rivulet, by the Tapera of Doña Marequita (where some years ago stood the military canton "6 Julio," established by Baron du Gratz, a distance of 14 leagues from Santa Fé), over the Campo de la Grana to the Cañada de la Soledad. In this last-named place there are the ruins of an old fort, erected here in the time of the Spaniards, on the right bank of the Salado. Thence across the Arroyo San Antonio, to Biscachera, Las Conchas, and Monte Aguara, a distance in a right line by land of only 32 leagues, although by the winding of the river it is 120 leagues from Santa Fé. From thence our expedition returned to Esperanza, in consequence of having found no water for drinking or cooking purposes.

Captain Page ascertained Monte Aguara to be in lat. 30° 10′ 50″ s.; long. 60° 38′ 47″ w.

Through the whole of this extent the Salado receives as tributaries the Cululu, which joins it a few miles above the colony, and the Rio de las Vivoras, flowing into it from the opposite or north-eastern Chaco, opposite Monte Aguara. The rivers La Cruz and Saladillo, mentioned in Page's and Coghlan's charts, were dry beds at the time of my passing; the Arroyo de la Soledad never has water except during a few months of heavy rain; and the Arroyo San Antonio, where we crossed it, ran in an opposite direction, and therefore, unless coming from the Salado, which seems improbable, has no connection with that river.

The stillness of these Chaco plains, uninterrupted save by the generally prevailing wind—the "Viento del Norte"—with its sirocco heat, rattling through the trees, bushes, and long grass, the singing of birds, and twittering of insects, was very impressive. The noise made in many places by these last-named does not so much resemble "the summer hum of insects," as it does the "mad elephants of Coketown," described by Dickens in his 'Hard Times.'

The Chaco bears little resemblance to the extensive level of the Pampas. The former has undulating ground; here and there extensive lagunas in the wet season, which in the dry are white beds of salt or saltpetre; now and then single trees, or large groves called "Montes," alternating with grassy camp. Yet in no part of it is there an extensive view, save from one piece of rising ground in the district of "La Soledad," whence we have a vista for several leagues beyond the opposite side of the Salado.

The principal trees in these woods are the Aroma, the Nanduhoy, the Algaroba Chañar, and Quebracho, with a few species of Mimosa. But none of them have large stems, and all being furnished with crooked branches, are useless for practical purposes, save in serving as firewood, or making "corrals" for sheep and cattle.

Returning to the colony of Esperanza, our next course was by the military canton of Sauce, garrisoned by a regiment of so-called "civilised" Indians of the Abissones tribe; thence to Zarate, another canton; from that to Romero, and on to Quebracho. This last is a deserted military post, and forms the dividing line at this point between the provinces of Santa Fé and Cordova. It is 43 leagues from Santa Fé city.

Before arriving at the little town of Concepcion, formerly called San Justo, which is 12 leagues beyond Quebracho, and is capital of the Partido of Tio, in the province of Cordova, we crossed over the bed of the Rio Segundo, which now (the 6th of January) has not a drop of water in it. From this, through Manantial and Tajaruses, we reach the dry bed of the Rio Primero. Not more than 500 yards beyond this we pass another river bed, which I am told was the old course of the Primero, from which the river diverged itself into a new channel—the first crossed—a few years previously. The beds of these rivers have a bank on either side to the height of 8 to 10 feet, so that when water flows here it must do so in considerable volume.

We are now on the road which in old Spanish times constituted the frontier of Cordova province towards the Chaco. That the boundaries of this, as well as of the Santiago del Estero province, have been extended since that time, is evident from the existence of a newer road, the Sunchales, which passes from Santa Fé upwards near Lake Porongos, as well as that the national government at Paraná, in 1860, is reported to me to have published a map, extending the lines of these provinces across the Chaco on both sides of the Salado, as far as the river Paraná.

Our first view of the Sierras of Cordova, lying away to the westward, was from the estancia of Anita Poso, 30 leagues beyond Concepcion. When pointed out to me by our "vaqueana" (guide), they appeared like a panorama of cloud-land; but gazing for a few minutes, I saw the mountain tops developed from under a canopy of silver sky.

Advancing on through a district having as much uniformity in its arborescent character as the Pampas have in their flatness, we arrive at San Roque, the dividing line of Cordova with the province of Santiago del Estero. The vegetation here varies little from that of the Chaco, save that there are more species of Algaroba, many new varieties of shrubs, and occasionally some of the Tuna and Cardon cactus.

From Anita Poso—whereat I have recorded the last distance—to San Roque, the following table comprises the places passed, and the spaces intervening. It may be advisable to premise here that the league measurement in this country is a very indefinite one. There are three classes of leagues in the Argentine Republic: 1. The common league of 5000 varas (yards); 2. The legal league of 6000 varas; 3. The old Castilian, 6,666 varas. The league of Tucuman is only 4500 varas. The league in the following table I believe to be the common one.*

* The tables of distances given by the author do not always accord with his map, besides being vague in the standard of measurement.—ED.

From Anita Poso to San Roque.

From	To	Leagues
Anita Poso	Macha Muerta	1½
Macha Muerta	Fuertecita	3
Fuertecita	Capilla de la Encruzijada	2½
Capilla de la Encruzijada	Ponciana Pucheta	1
Ponciana Pucheta	Manuel Garcia	3
Manuel Garcia	Tajamares	3
Tajamares	Puesto de Castra	1½
Puesto de Castra	Puesto de Luna	2
Puesto de Luna	Puesto de la Viuda	1½
Puesto de la Viuda	Las Palmitas	1½
Las Palmitas	La Canada	1
La Canada	El Guanaco	1½
El Guanaco	Puesto del Medio	2
Puesto del Medio	Candelaria	2
Candelaria	San Roque	3
	Leagues	30

It may not be out of place to give a synoptical notice of what appeared to me the points most worthy of observation in the districts just enumerated.

On passing the Capilla de la Encruzijada, we find four roads crossing; one to and from the city of Cordova, another communicating with the Sunchales road already mentioned; the third, with Chañar, *alias* Villa San Francisco, in the province of Cordova; and the fourth (that by which we were bound) through Caravacal to the cities of Santiago and Tucuman. As we advance, the route is as wide as any of the Queen's highways in England, and the ground on either side of it is literally carpeted with the ripe pods of Algaroba fruit, upon which men, women, children, cows, sheep, pigs, goats, and dogs feed in this part of the country.

Whilst staying at "El Guanaco" estancia, I was informed by its owner, Don Balledia Oliva, that besides the Laguna Porongos, into which the Rio Dulce is believed to empty itself, there is a series of lakes parallel with it for many leagues. One of these is about 16 leagues from El Guanaco, in the direction of Tigre Post of the Cordova and Santiago Diligencia road. It has the name of "Las Salinas del Aloma Blanco." Another of them is in the Chaco direction, near a place having the Indian name of Quibua; a third is at Amopo, in the same direction; a fourth at Rumipuku; a fifth about 20 leagues from San Roque, and near Fort Taboada, called "La Laguna de los Torres." Not far from Porongos, and Mr. Oliva believes at times of heavy rain communicating with it, is an equally large lake, the "Mariquita." So that here, I may say, we are literally in the "Lake district."

Of the "Laguna de los Torres," I was subsequently informed by General Don Antonino Taboada, that this lake had for many years been supposed to be tenanted by an old witch, who had hair two yards long, as well as the reputed power of the heathen Syrens. Consequently, no one was ever known to have gone in that neighbourhood, from dread of the witch, till the General passed it with his soldiers when crossing the Chaco, in 1857.

Away from San Roque, we come into the province of Santiago, amidst millions of musquitoes, and here we find the principal vegetation to be the Cactus family, chiefly of Tuna and Cardon. Santiago possesses a peculiarity, in the fact that although it is nearly in the centre between Tucuman, Paraguay, Corrientes, Santa Fé, and Cordova, the general language spoken here is the Quichua. It is likewise remarkable that at a distance of two miles outside the province at any point, the Quichua is not spoken.

Progressing to Carmen, we find a Rio Viejo, or old bed of the Dulce, which changed its course in A.D. 1820. Indeed, over every part of this province, through which I subsequently travelled, the empty beds of what are represented to me as having been formerly either the course of "Salado," or "Dulce," exist in extraordinary numbers. The majority of these have a depth of from 20 to 25 feet below the adjoining superfices.

At the foot of a small sierra in Sumampa is a chapel, which contains within its walls a statue of the Blessed Virgin (as the Mother of Consolation), and this statue is erected on a large slab of rock, in the centre of the chapel, left there for that purpose when the building was erected.

Proceeding onwards from Grumillaco, the road becomes prettier, chiefly because we have hills and dales, rocks and trees, with now and then the brown roof of a rancho peeping from the branches and foliage.

Our first view of running water since crossing the Cululu in the Chaco, was at the Rio Dulce, when passing it at Saladillo, 5 leagues beyond Caravacal. At this time (18th January) it was only about a foot and a half deep, and 10 to 12 yards wide, although a running stream. Between this and Salavina, we passed over two beds of the old stream of the Dulce, now dry; and thence to Gramilla, we skirted two more—one at Santa Lucia, another at Maylin. In each of these places the depth of the dry channel was like that seen before, namely from 20 to 30 feet.

At Salavina, we were 24 leagues from Fuerte del Bracho, north-west, and 43 from the city of Santiago, north-east.

In our last journey from San Roque the distances are:—

From San Roque to Fuerte del Bracho.

From		To		Leagues.
San Roque	.. ..	El Carmen	.. ..	2½
El Carmen	.. ..	Munchin	.. ..	4
Munchin	.. ..	Sumampa	.. ..	2½
Sumampa	.. ..	Santa Rosa	.. ..	0¾
Santa Rosa	.. ..	Grumillaco	.. ..	0½
Grumillaco	.. ..	Puesto del Monte Abajo (Lower)	..	2½
Puesto del Monte Abajo	..	Puesto del Monte Arriba (Upper)	..	0½
Puesto del Monte Arriba	..	Caravacal	.. ..	2
Caravacal	.. ..	Polvidero	.. ..	2
Polvidero	.. ..	Saladillo	.. ..	3*
Saladillo	.. ..	Cerillo	.. ..	2
Cerillo	.. ..	Tarucapampa †	.. ..	2
Tarucapampa	.. .. ..	Salavina	.. ..	4
Salavina	.. ..	Santa Lucia	.. ..	1
Santa Lucia	.. .. ..	Maylin	.. ..	6
Maylin	.. ..	Gramilla	.. ..	5
Gramilla	.. ..	Fuerte del Bracho	.. ..	5
		Leagues	.. ..	48½

The position of Fuerte del Bracho is, according to Captain Page, in lat. 28° 21′ 15″ s., and long. 63° 12′ w. This place stands about 6 leagues from Navicha, south-east, and nearly the same distance from the Boca de Matara. It might be said to be on the right bank of the Salado, but that here that river has no bank; for between the Boca and Navicha, the waters of the Salado spread out into an enormous lake. And it is in this neighbourhood that are needed the chief operations of canalization—now progressing—to make the navigation an accomplished fact.

I visited Matara ‡ town, about 5 leagues above the Boca, on the 25th of January, and in front of it the river was running at the rate of at least 3 knots per hour—had a breadth of about 40 feet, and a depth of 5 yards. In this year the first flowing water passed Matara on the 9th of January; on the 10th it issued from the Boca 5 leagues lower down, and yet in consequence of being wasted over the immense flat surface here, the flowing water did not arrive at the channel, which passes Gramilla 7 leagues further, till the 19th of same month.

The water coming at this time of the year, before the rainy season commences in the lower provinces, is known to be from the melting of snow on the Cordilleras, whence I purpose showing, a little further on, that the upper waters of the Salado proceed.

* River Dulce crossed here.

† Tarucapampa is the Quichua word for "Wild goat of the Pampa."

‡ So called after its founder 'Matahara,' a cacique of the Juri tribe of Indians from Peru.

From this month of January, when it begins to rise, the river continues increasing till April, then decreasing gradually in quantity to September, whence until the ensuing January, even in the upper parts, it is almost dry.

The Salado here has many ancient beds now dry, as the Rio Dulce has lower down.

A ride to the military canton of Sonchoposa from the Bracho brings us to what is, when the water is here, the opposite side of the river. We passed near where it was trickling down, and absorbed into the dry and porous soil over such an extent as to make it wonderful that a drop could ever reach Navicha.

The ensuing table of distances is, from Fuerte del Bracho to the capital of Santiago:—

From Fuerte del Bracho to Santiago.

From	To	Leagues.
Fuerte del Bracho	Maylin	12
Maylin	Cosholnioq	7
Cosholnioq	Talaposa	3
Talaposa	Garza	3
Garza	Lloa	4
Lloa	Benel	3
Benel	Morsillo	2
Morsillo	Chilca	1
Chilca	Coropampa	3
Coropampa	Santiago City	4
	Leagues	42

Before the time of the Taboada Brothers here there were only three roads between the rivers Dulce and Salado, now there are more than thirty. One road was made in 1852, by a few thousand rebels, whom the General set at the work. It extended on each side of the Salado, from Fuerte del Bracho to San Miguel—a distance of 120 leagues, or 360 miles, *i.e.* by river's bank.

Through several leagues of territory along the right bank of the Salado, from Navicha upwards, we have the Salado frontier forts, organised by General Don Antonino Taboada, and laid down on the accompanying sketch. They have been very useful in resisting invasions of the Chaco Indians coming to rob estancias. In connexion with them exists a most perfect military discipline, which I have described elsewhere, and more than a passing notice of which is not pertinent to a geographical paper.

All the land on the right bank of the Salado, from Fuerte del Bracho upwards to San Miguel, which stands on the opposite side, is in the province of Santiago. At least this is the boundary line with the province of Salta, claimed by the Santiaginians. The Saltenas, however, will not allow it higher up than a place called

"Lachiguana," 15 miles below San Miguel. At Lachiguana, or San Miguel—whichever it may be—the Salado loses its name, and hence upwards to Salta city it is entitled the "Pasaje," or "Juramento." This latter name it derives from the fact that General Belgrano being on one of its banks with his troops soon after the declaration of independence, in 1810, made the soldiers swear fidelity to the new colours adopted by the Argentine revolutionists. Hence the title "Juramento," which I need scarcely explain, in the Spanish language, signifies "oath."

I am indebted to Dr. Don José Antonino Zabalia, of Salta, for much information about the River Pasaje in its upper course. Its first known sources are the Rio de la Silleta and the Rio de Arias, whose confluence forms that part of the Pasaje which flows near the city of Salta; then turning directly south for some leagues, it is joined by the Rio de Gauchipas, the Rio de Escoije, and the Rio Punto de Diamante. All of these have their origins in the eastern serrania of the Andes. Indeed the last-named (Diamante) is known to spring from the Cuesta de Acai—in the north-west portion of Salta province—a mountain covered with perpetual snow.

From the valley of Lerma, where all these streams meet, the river runs in an easterly direction, till its course is turned south by a chain of small hills—the Serrania de Limbreras. This southern course it continues to Miraflores, before arriving at which it is joined by the Rio Blanco and the Rio de las Piedras. From Miraflores it again turns eastward to Chañar-Muyu, and in this last-mentioned course it receives two other tributaries, the Rio de Guanacos and the Rio de Castellanos. As it flows on hence from Chañar-Muyu to San Miguel in a south-eastern direction, it receives the Rio de la Concha, Rio de Matan, Rio de Yatasta, and Rio de Rosario. From San Miguel, where it takes the name of Salado, to its embouchure into the Paraná, at Santa Fé—a distance of above 800 miles—the course of the river is generally south to south-east.

The Salado, or Pasaje, not being yet made navigable, communication from and to different parts of the upper country through which these rivers run must needs be effected by roads. From Miraflores to the city of Salta, is a road of 43 leagues length. A road likewise communicates between Salta city and Oran, which passes amongst sugar-plantations—through the town of Cobos—and along the valley, through which flows the Rio de Lavayer, that falls into the Bermejo, near Oran. From Oran there is a road likewise to Chañar-Muyu, through the districts of Rio del Valle and Mais Gordo.

Starting from Fuerte del Bracho through the Upper Salado Valley, my course was as follows:—

From Fuerte del Bracho to Tucuman.

From	To	Leagues.
Fuerte del Bracho	Gramilla	5
Gramilla	Matara	12
Matara	Amba	3
Amba	Guaype	2
Guaype	Repecho	1
Repecho	Reduccion	1
Reduccion	Corral Grande	1
Corral Grande	San José	5
San José	Simbolo	4
Simbolo	San Isidro	2
San Isidro	Humiliato	3
Humiliato	Palmaris	3
Palmaris	Umiampa	3
Umiampa	Cordonara	1
Cordonara	Herreira	3
Herreira	La Brandon	4
La Brandon	Los Sanchos	3
Los Sanchos	Las Tres Cruces	5
Las Tres Cruces	Los Tres Posos	7
Los Tres Posos	Favorina	7
Favorina	Tucuman City	6
	Leagues	81

Besides the part of this road from San Isidro, to which General Don Antonino Taboada accompanied me from Fuerte del Bracho, the General had written down for me a road after passing Umiampa, through the localities of Palos Quemados, Lloa, Guappo, Tenene, Talaposa, and Ramado. But the last-named route being nearer to the River Salado, now beginning to overflow its banks, I was obliged to submit myself to the guidance of my "vaqueana," and take the former.

The greater number of places mentioned in the foregoing list are what are entitled "pueblitos," or small villages, where the inhabitants live together for mutual protection against the Chaco Indians, a perpetual dread of whose invasions seems to be one of the established institutions of the upper provinces. Little or no cultivation, except a few patches of melons, sandias, or sapaios, is seen anywhere, but every house has a small flock of sheep or goats, guarded by trained dogs. From the milk of these flat cheeses are made. At Palmaris, as its name would indicate, we saw several stunted-looking palm-trees, having nothing about them of the vivid and graceful arboresence of the tropical palm. From an eminence at La Brandon, I got the first glimpse of the mountain tops of Tucuman. At the village of Las Tres Cruces, on this road, is the dividing line between the provinces of Santiago and Tucuman.

My entrance into Tucuman (on 8th February) was at the beginning of the heavy rainy season here. In the northern provinces of Tucuman, Salta, and Jujuy, they have a Spanish adage with reference to the rainfall: —

"In Enero poco,
In Fevrero loco."

That is to say, "In January it rains little, but in February it pours down madly."

The name Tucuman is derived from the founder, one of the early Indian chiefs, "Tuku-human." This word is compounded of "Tuku," the Quichua name for a sort of firefly that has a very brilliant pair of eyes, and "Uman," in the same language, for "head." No doubt it was a *nom-de-guerre*, intended to express the brightest form of intelligence, for he was reputed one of the most astute caçiques of his age and time.

There is a good deal of decay and neglect about Tucuman city, but, nevertheless, it has the semblance of having been at one time a fine place. Except at the southern side, it is surrounded by mountains. The population of Tucuman province is reckoned at from 80,000 to 100,000, whilst the capital has from 9000 to 10,000 inhabitants. The streets are much better paved than those in Buenos Ayres, and the Plaza has orange-trees growing on each side of its square. The chief public buildings are the Cabildo and the Matriz (or parish church), both in the Plaza. The former is the historic spot where was signed the Declaration of Argentine Independence, in 1816; and the latter has been recently rebuilt, having been begun in 1847, and only finished in 1853. This church has an organ in it from London. The greater part of the sugar manufactories here have had their machinery from Liverpool.

The Government supports twelve schools in the country, and four in the city; whilst in the latter there are four private establishments of this kind.

I learn from Dean Funes'* work that when the Spaniards held sway over the parts of South America interior to the River Plate, they were all partitioned into the three divisions of Buenos Ayres, Paraguay, and Tucuman. Buenos Ayres, which was the seat of vice-royalty, included the present city and province of that name, with Mendoza, San Luis, and Santa Fé; Paraguay embraced with it Corrientes and Entre Rios; whilst Tucuman comprised what is now its own province, together with Cordova, Santiago, Salta, Jujuy, Catamarca, and Rioja. Of these three divisions Tucuman then owned the largest extent of territory; whilst at present, as may be observed by the following boundaries, as well

* 'Ensayo de la Historia Civil del Paraguay, Buenos Ayres y Tucuman. Escrita por el Doctor D. Gregorio Funes, Dean de la Santa Iglesia Catedral de Cordova.' Buenos Ayres, 1816, tom. iii.

as the accompanying map, it is the smallest province of the Argentine Republic. The first curtailment of Tucuman was made by the Spanish Government, who divided it into two "intendencias" of Cordoba and Salta, in 1778. In its present limits, from the capital to the boundary line of Catamarca to the westward, are 60 miles. To the south-west the junction of Tucuman with Catamarca is the Rio San Francisco, a distance of 120 miles from the capital of the former. The dividing line of Santiago on the south-east, at Las Tres Cruces and Bagual, is 54 and 60 miles respectively from Tucuman city. Whilst from this last-named to the northern limit of the province where it is separated from Salta by the Rio de Sali, we have only 74 miles. In fact, Tucuman province comprises no more than 60 leagues from north to south, and 45 from east to west.

The separation of Tucuman from Catamarca is clearly marked by a chain of sierras—spurs of the Cordilleras—the best known of which is Tafi, from whence famous cheese is brought. North of Tafi, the province of Catamarca is divided from that of Salta at an estancia known as Tolahihu. Salta has its junction with Santiago at the north-west of the latter, in a point, called Remate, nearly parallel with, and distant 24 leagues from, San Miguel.

Visible from Tucuman city to the south-west are several mountains—one styled San José, another San Pablo, and a third San Xavier. Overtopping these we can see in Catamarca the snow-capped mountain entitled Anconquija. Besides these, to the north we have the mountain chain, called Chañar; and away down east is the lofty point of La Tumba.

It is merely for geographical accuracy, and not with the object of casting any reproach on the labours of others, that I point out the fact, how, in Sir Woodbine Parish's, as well as in Captain Page's and Mr. Coghlan's charts, the province of Tucuman appears as if it crossed the Salado River. Whereas, it may be observed, from the province of Santiago reaching up to San Miguel, and from the limited boundaries just given, that in no place does it approach that river. The existing boundaries of this province have been so since 1816.

General Taboada informs me, that from the city of Tucuman in a direct line to the Salado is a distance of 120 miles, 42 of which are in the province of Tucuman, and 78 in that of Santiago.

During the whole of my journeying through this province (Tucuman), I felt a conviction of its deserving the titles which it bears—"The Garden of the Confederation," and "Italy of the Argentine States." Everywhere there existed a greater and richer variety of natural vegetation than I have seen in any other of these provinces. The soil, where it was turned up, showed a rich, dark, argillaceous loam—not the arenaceous type so general in Santiago, and much of which latter is likewise to be found in Cordova. Very little of the soil is, however, cultivated, save in the neighbourhood of the capital, where the sugar-cane is reared, as well as sugar manufactured, and caña (aquardiente) distilled therefrom.

From Tucuman to the adjoining province of Salta to the north we have the following posts and distances:—

From Tucuman to Salta.

From	To	Leagues
Tucuman	Ramada	7
Ramada	El Puesto	6
El Puesto	Chilca	6
Chilca	Florida o Laguna	4
Laguna	Ojo de Agua	2
Ojo de Agua	Canas	7
Canas	Mojorras	11
Mojorras	Juntas	7
Juntas	Conchas	4
Conchas	Rio Blanquito	6
Rio Blanquito	Rio Pasaje o Juramento	7
Pasaje	Cieneja	10
Cieneja	Limbolar	3
Limbolar	Ramadita	7
Ramadita	Salta	7
	Leagues	94

More than a hundred years ago, the town of Esteco,* in this province (Salta), was swallowed up with all its inhabitants—five thousand or so—by an earthquake. Some vestiges of it still remain, although not a single member of its living humanity escaped at the time. It was situated at the foot of a sierra near Monte Flores, between the Rio de las Piedras and the Rio de las Conchas.

In the central part of Salta province are two sugar-loaf mountains in the middle of a vast plain. They are reputed never to have been traversed nor even ascended by travellers, because the people say, when such attempts have been made, the mountains tremble and groan, as if from the convulsions of some living monster within.

Entering into, or emerging from Tucuman city, in connection with the southern road of Santiago, we cross the River Sali about a mile outside, at a place called El Paso de la Banda. This river is to the Dulce what the Pasaje is to the Salado, namely, its upper

* From the position of this city, I have no doubt that it is the same "Esteco or Nuestra Senora de Talavera," reported by Sir Woodbine Parish as built in 1567 upon a stream called the Rio de las Piedras, near its junction with the Salado." Vide 'Buenos Ayres from the Conquest,' &c., p. 273.

water. Between where we cross it here, and where it terminates at Lake Porongos, it has the different names of Rio Sali, Rio Sotalije, Rio Santiago, and Rio Dulce, yet being but one and the same stream. In its course through Tucuman province it receives more than twenty tributaries, the principal one of which is the Rio Hondo, that flows into it from the north-west.

From El Paso de la Banda to Bagual post, we have 16 leagues, and this is the dividing line here between Tucuman and Santiago. Thence to Sotalije we have 10 leagues more. The whole of this distance is a rich alluvial soil, not a single noxious weed existing through all its extent.

At Sotalije, as may be expected from the many tributaries received on the way down, the river is now a noble stream, about 200 yards wide, and with a very strong current. Our passage across was made on "chatas," for there is a very considerable depth.

From this to the capital of Santiago, a distance of 20 leagues, our road lay not far from the right or western bank of the river, through the small towns of Ximenes, Tippero, Garostiago, and others.

Santiago has all the appearance of a city, which had been sacked, for the greater number of its houses are perfect ruins. This city is reported to me, by His Excellency Governor Don Manuel Taboada, to contain above 8000 inhabitants, although Captain Page allows it only 5000. The old church, built by the celebrated Indian missionary, San Francisco de Solano, has nothing left of it but a few fragments of walls. The chapel of La Merced in the Plaza is a complete wreck, its roof having fallen in some time during the year 1852. This city possesses an army of 700 national guards, of whom 150 are merchants. They are a kind of special constables.

The first capital of Santiago was founded by Señor Don Juan Nuñez de Prado, in 1549. It was situated at the other side of the river opposite to where the present stands, and was called the "Ciudad del Barco." According to Dean Funes, this was destroyed by the overflowing of the Rio Dulce, in 1552. The site of the present capital was fixed in consequence of San Francisco de Solano having erected his church there; and its name of "Santiago de Estero" was given by the then Captain General, Señor Don Francisco de Aguirre.

From this city we go along for a journey of 15 leagues to where the Rio Dulce is again crossed on "chatas," at a place called Guaychani; thence through Loretto, Mistol, Atamisca, Barrancas, Quamillo, and other places; again through Salavina to Saladillo, where we crossed the Dulce on our way up, a distance of 41 leagues.

During our stoppage for changing horses at Loretto, I was informed of a river, about a league to the west of this town, called the Rio Pinto, which has a course of 7 to 8 leagues. Rising, my informant did not know where, and losing itself over a large extent of ground, as the Dulce does at Porongos. The most remarkable feature of country between Santiago city and where we cross the Dulce for the last time at Saladillo is the number of empty river-beds over which we pass. These are explained to me as having been courses of the Rio Dulce in its former days.

It is, to say the least of it, a geographical error to place the road from Tucuman to Santiago, or thence to any place as we go along, in the manner whereby they are generally marked on charts, that is to say, in a straight line; for they are more like what we might imagine the track of a large sea-serpent to make, or of a wandering river, than roads made by men who had any design of expedition in their heads—from north to east, from east to south, from south to west, "and back again, and round about." Making all points of the compass within a few miles, and diverging from a semi-crescent sweep at one place, to a right angle at another, our diligencia twines itself along.

As it had been raining almost incessantly since my arrival at Tucuman (on the 8th of February), and our progress had been thereby much retarded, it is no wonder on arriving at Saladillo that we found the Dulce, which had only 1½ foot of water in it, and was no more than 12 yards across on the 18th of January last, now, on the 26th of February, an immense rolling stream, at least half a mile wide; many of the trees on its high banks were also more than half-covered. Crossing was, of course, effected, as higher up, by "chatas."

From Saladillo our course was by the same road as I travelled before, namely, through Caravacal, Puesto del Monte, and Grumillaco—a distance of 10 leagues—some short distance beyond which we turned to the right, because now bound to Cordova city.

From Saladillo to the dividing line between Cordova and Santiago provinces, namely, the Arroyo de Athanaja, is a distance of 20½ leagues. Between the posts of India Muerta and Vaio, before leaving Santiago province, we find the road to be in a valley between two ranges of the Santiago sierras, that of the "Sierra de la Soledad" on the right, and the Sierra del Chilco to the left. But the road has so many windings and turns that we seem alternately approaching either side of the mountain, although our proper road is south-west between them.

The country around "Rio Seco," the first town we enter in the province of Cordova, is a pretty amphitheatre, hills rising up in all directions. The next post from this is La Gramilla, 2½ leagues south of which we cross the "Rio de los Tortegas," which rises in

San Pedro Mountain, about 5 leagues to the west of the road whereby we cross it, and empties itself over the land some few leagues lower down, as do nearly all the rivers we meet in this part of the world. Passing along here we have a view of the lofty mountain Inchiguasi, which, in the Quichua, means "House of the Sun," styled so from the poetic notion that when the sun sets behind this hill in the evening, he returns to his house for the night.

Across another small river, the Piscoquisi, rising and falling, like that previously mentioned, between the post-houses of Saussee and San José, there is a very beautiful view of the country—large woods and extensive plains—from an eminence a few leagues beyond Strechuras. Our view from this is limited by the Simbolar range of mountains, that divides Cordova from Catamarca.

According to Captain Page, "Cordova city stands near the right bank of the Rio Primero, in lat. 31° 24′ s. long. 64° 9″ w., on a plain 1240 feet above the level of the Parana at Rosario." It was founded in 1573, by Don G. Luis de Cabrera, who was at that time Governor of the Department of Tucuman. This city has a very imposing appearance when entered from the northern road, the stately spires of its many beautiful churches giving it quite an air of ecclesiastical majesty.

Its university was established in 1613, by the Bishops Fernando Frejo and Sanabria; and the College of Monserrat was opened in 1686. I visited the old library, so famed in the history of the Jesuits here, and found it to consist of four rooms on the ground-floor of the university, shaded from the courtyard by a corridor. On one of its doors was a square iron plate, about a foot in measurement, whereon was painted in very badly-executed white letters, the following inscription:—"BIBLIOTECA PUBLICA DE ESTE UNIVERSIDAD DE CORDOBA, FUNDADA PAR SU GOBERNADOR VISITADOR Y PROTECTOR, DR. DON MANUEL ANTONIO DE CASTRO, ANO DE 1818" That this was a new foundation on what the Jesuits had amassed, is evident from the date. No admission being obtainable, I am unable to judge of its contents.

By Sir Woodbine Parish's work* I learn that the province of Cordova had, according to a census taken in 1822, "a population of something more than 85,000 souls, of which from 12,000 to 14,000 lived in the city." Captain Page, in 1855, estimated the province at 100,000, of which the capital contained 15,000.

I am informed, from the census of 1858, that this province contains nearly 200,000 inhabitants, of which above 30,000 are accredited to the capital. This census, however, has been taken since Captain Page's work was compiled.

* Op. cit. p. 279.

One of the prettiest places I have seen in any part of the Argentine Republic visited by me, is the "Alameda" of Cordova. This is a cuadra, or square of water, on each side of which are a number of very lofty weeping-willows, at least 50 feet high. Between these trees and the railing there are a number of seats, and in the centre of the lake a little temple, intended for a band of music. It was a work of the Jesuits.

From Cordova to Rosario, the chief places of historical importance that we passed were:—1st, Laguna Larga, where, in 1831, a battle was fought between the Unitarios, under General Don José Maria Paz, and the Federals, under General Don Fecunda Quiroja; 2nd, Lobaton, where, in 1810, fell six of the first martyrs (officers of the Spanish Government) to the then falling dynasty of Spain and the rising spirit of Argentine independence. It is believed that on the morning succeeding their deaths there appeared in the grove hard by, the word "CLAMOR," with a ray of glory, each letter of this representing the initial of each one of the murdered men's names.

These and such like incidents are, however, giving way to the introduction of industrial progress from Europe, and in no part of the Republic is there such an important feature of this to be recognised as in Mr. Wheelwright's proposed line of railway to connect Rosario with Cordova, and bearing on which I may note a few important facts:—

1st. Any one who will glance at the map accompanying this paper, can see that except for Buenos Ayres, Entre Rios, and Corrientes provinces—the two latter being at the opposite side of the river Paraná—Rosario is the natural outlet for all the rest of the Republic, namely, Santa Fé, Cordova, Santiago de Estero, Tucuman, Salta, Jujuy, Catamarca, Rioja, San Juan, San Luis, and Mendoza, or, in fact, for *eleven* out of the *fourteen* provinces that comprise the Argentine Republic.

2nd. There exists at the present time a carrying trade, effected by bullock-carts, between Rosario and the inner provinces, of from 16,000 to 18,000 tons per year.

3rd. Mr. Campbell, C.E., who surveyed the line in 1855, reports it as having the advantage of going alongside the Rio Tercero—a river that is never without water—for a great part of its route; whilst the flat surface of Pampas country, over which it is to proceed, presents no engineering difficulties whatever. The course of the line surveyed by Mr. Campbell is 247 English miles, and he observes that "up to this time no railway equal in length has been built over so smooth a surface."

Aside from the question of pecuniary value, which Mr. Campbell proves in his report, he adds, "This work possesses an importance which cannot be too highly appreciated. Every measure which tends to identify and concentrate the interests of these widely extended provinces, is a step towards their consolidation and peaceful union; and next to the navigation by steam of its noble rivers, there is certainly no work of improvement within the country so worthy of attention as the railway which constitutes the subject of this report. It is neither sectional nor provincial in its character, but its blessings would be felt to the remotest extremities of the Republic. Resting upon the waters of the Paranà, and penetrating to a convenient central point, from which carriage-roads, and at some future day railways, may radiate to almost every province, it becomes the trunk of an extensive system, whose harmonious operation will tend to the commercial prosperity of the country, as well as to its political security."

These are opinions, the sound judgment of which I do not entertain the slightest doubt.

From Cordova it is the plan of Mr. Wheelwright to continue the line thus:—

	Miles.
1. Rosario to Cordova	250
2. Cordova to eastern base of Andes	350
3. Eastern base of Andes to junction with Tres Puntos Railway	320
4. Junction with Tres Puntos Railway to Caldera	80
Total length	1000

No better account of Rosario as a proper beginning for this railway need be given than the following hydrographical description of it by Captain Page* :—"There are considerations which would make Rosario, even when approached by sailing-vessels, quite as accessible from the Atlantic as Buenos Ayres. The difference of time in loading and discharging cargo is decidedly in favour of the former. These difficulties at Buenos Ayres are too well known to the commercial community to need from me much illustration. The south-east winds agitating the wide expanse of the river at that point produce so high a sea, that during their prevalence no vessel can either discharge or receive cargo. The winds which create the sea are the fairest for the ascent of the river, and good for the beat-down with the current. In forty-eight hours, or less, a vessel, with a southerly wind, may reach Rosario from the latitude of Buenos Ayres, off Martin Garçia, or any neighbouring anchorage. Arrived there, no detention dependent on the winds can occur. With anchor in the stream, and breasting-lines upon land, a vessel may be laid near enough to shore to make a plank a safe pathway. With the erection of wharves, the town

* Op. cit. p. 78.

would be as accessible as any of our commercial cities. The Paranà, from its mouth to Rosario, is not very tortuous, having a general course of N.N.W. The prevailing south wind is, therefore, fair in the ascent throughout this distance. I must not omit to state that such a wind is necessary to all sailing-vessels, because the current of two to two and a-half miles per hour will baffle all efforts to contend with it by beating. . . . . In descending the river no detention need ever occur, its width being sufficient to admit of beating down during contrary winds."

Whether Mr. Wheelwright purposes to continue the line across to Caldera by the designed route through Rioja and the western part of Catamarca, and over the Andes Pass of San Francisco, or whether he will endeavour to ascertain the existence of a shorter and easier route, reported as lately discovered between San Juan and Mendoza, therefore in a more direct line to Valparaiso, I cannot say. But in whatever direction this work may be effected, by joining, as it were, the Atlantic and Pacific Oceans across the South American Continent, it must eventually prove the most beneficial, most important, and most advantageous, in a commercial as well as civilizing point of view, of any engineering work of modern times.

XVI.—*Explorations to the West of Lake Nyassa in* 1863. By Dr. DAVID LIVINGSTONE, M.D., LL.D., F.R.G.S. (Gold Medallist.)

(Addressed to Sir R. I. MURCHISON, Pres. R.G.S.)

Read, June 13, 1864.

"Murchison's Cataracts, Dec. 4, 1863.

"THE despatch containing instructions for our withdrawal, though dated 2nd of February, did not reach me before the 2nd of July, when the water had fallen so low that the *Pioneer* could not be taken down to the sea. To improve the time, therefore, between July and the flood of December, I thought that I might see whether a large river entered the northern end of Lake Nyassa, and, at the same time, ascertain whether the impression was true that most of the slaves drawn to Zanzibar, Kilua, Iboe, and Mozambique, came from the Lake district. With this view, I departed, taking the steward of the *Pioneer* and a few natives, carrying a small boat, and ascended the Shiré. Our plan was to sail round the eastern shore and the north end of the lake, but unfortunately we lost our boat when we had nearly passed the falls of the Shiré; the accident occurring through five of our natives trying to show how much cleverer they were than the five Makololo who had hitherto had the management of it. It broke away from them in a comparatively still reach of the river, and rushed away like an arrow over the cataracts. Our plans after this had to be modified, and I resolved to make away for the north-west on foot, hoping to reach the latitude of the northern end of the lake without coming in contact with the Mazite, or Zulus, who have depopulated its north-western shores, and then go round the Lake from the west.

"We soon came to a range of mountains running north and south, rising about 6000 feet above the level of the sea. The valley on the eastern base was 2000 feet above the sea, and was of remarkable beauty—well supplied with streams of delicious cold water. This range forms the edge of the high table-land (called Déza) on which the Maravi dwell. We were, however, falsely told that no people lived on the other side, and continued our course along the valley until we came out at the heel of the lake—the bold mountainous promontory of Cape Maclear on our right, and the hills of Tsenga in front of us. Again starting off towards the north-west, we came to a stockade which the Mazite, or other natives pretending to be of this tribe, had attacked the day before, and we saw the loathsome relics of the fight in the shape of the dead bodies of the combatants. Wishing to avoid a collision with these people, we turned away towards the north-east until we again came to the Lake, and marched along its shores to Kota-Kota Bay (lat. 12° 55′ s.).

"At Kota-Kota Bay we found two Arab traders busily engaged in transporting slaves across the lake by means of their boats; they were also building a *dhow* to supply the place of one which was said to have been wrecked. These men said that they had now 1500 souls in their village, and we saw tens of thousands of people in the vicinity who had fled thither for protection. They were the same men whom we had seen on our last visit, but at that time they had very few people. Every disturbance amongst the native tribes benefits the slave-trader. They were paying one fathom of calico, value one shilling, for a boy, and two fathoms for a good-looking girl. Yet, profitable as it may seem, the purchase of slaves would not pay, were it not for the value of their services as carriers of the ivory conveyed to the coast by the merchants. A trader with twenty slaves has to expend at least the price of one per day for their sustenance: it is the joint ivory and slave trade which alone renders the speculation profitable. It was the knowledge that I was working towards undermining the slave-trade of Mozambique and Iboe by buying up the ivory, that caused the Portuguese to exert all their obstructive power. I trust that operations in the interior, under a more able leader, will not be lost sight of; for these will do more to stop the slave-trade than all the cruisers on the ocean.

"Kota-Kota Bay, which is formed by a sandy spit running out and protecting the harbour from the east wind, is the crossing-place for nearly all the slaves that go to Kilua, Iboe, and Mozambique. A few are taken down to the end of the lake, and for cheapness cross the Shiré; but at Kota-Kota lies the great trade-route to Katanga, Cazembe, &c. The Babisa are the principal traders; the Manganja are the cultivators of the soil. The sight of the new *dhow* gave me a hint which perhaps may be useful. She was 50 feet by 12, and 5 feet deep. I should never think again of carrying more than the engine and boilers of a vessel past the cataracts; the hull could be built here more easily than it could be conveyed hither. On the southern shores of the Lake there are many trees whose trunks are above 2 feet in diameter and 60 feet in height without a branch. The Arabs were very civil when we arrived, and came forth to meet us, and presented us with rice, meal, and sugar-cane. Amongst other presents they made us was a piece of malachite.

"On leaving Kota-Kota we proceeded due west. In three days we ascended the plateau, the eastern side of which has the appearance of a range of mountains. The long ascent, adorned with hill and dale and running streams, fringed with evergreen trees, was very beautiful to the eye, but the steep walk was toilsome, causing us to halt frequently to recover our breath. The heights have a delicious but peculiarly piercing air: it seemed to go through us. Five Shupanga men, who had been accustomed all their lives to the malaria of the Zambesi Delta were quite prostrated by that which, to me, was exhilarating and bracing. We travelled about 90 miles due west on the great Babisa, Katanga, and Cazembe slave-route, and then turned to the north-west. The country is level, but the boiling-point showed a slope in the direction we were going. The edge of the plateau is 3440 feet above the sea-level. At the Loangwa of the Lake the height shown is 3270 feet. The direction of the streams verifies these approximate heights and your famous hypothesis too; for the Loangwa of the Lake finds its way backwards to the Nyassa, whilst another river of the same name, called the Loangwa of the Maravi, here flows to the westward, and enters the Zambesi at Zumbo. The feeders of these rivers are boggy valleys, with pools in their courses. We were told we had crossed one branch of the Moitala, or Moitawa, which flows N.N.W. into a small lake called Bemba. The valleys in which the rivers rise closely resemble those in Londa or Lunda; but here each bank is dotted over with villages, and a great deal of land is cultivated; the vegetation is more stunted, and the trees covered with flat lichens, like those on old apple-trees in Scotland, besides a long thready kind similar to orchilla-weed; the land on which maize has been planted is raised into ridges instead of, as elsewhere, formed into hollows—all which reveals a humid climate.

As we were travelling in the direction whence a great deal of ivory is drawn by the traders on the slave-route, hindrances of various kinds were put in our way. The European food we had brought with us was expended; the people refused to sell us food, and dysentery came back on us in force. Moreover, our time was now expired. I was under explicit orders not to undertake any long journey, but to have the *Pioneer* down to the sea by the earliest flood. I might have speculated on a late rise in the Zambesi, but did not like the idea of failing in my duty, and so gave up the attempt to penetrate farther to the west. The temptation to go forward was very great; for Lake Bemba was said to be but ten days' journey distant; and from this, according to native report, issues the River Loapula (or Luapula) which, flowing westward, forms the lakes Mofu (or Mofue) and Moero, and then, passing the town of Cazembe, turns round to the north and is lost in Tanganyika. Is there an outlet to Tanganyika on the west into the Casai, to the east of the point at which I formerly crossed that river? All agreed in asserting that no river flowed eastward into Lake Nyassa. Two small ones do, but at a distance of, say, 80 or 90 miles from the lake; the watershed is to the west. One should have no bias in investigating these questions by the aid of travelled natives; but I had a strong leaning to a flow *from* Tanganyika into Nyassa or the Zambesi. I was, however, stoutly opposed by all; and I had crossed so many running streams, which, from entering the lake among reeds, had not been observed from the boat on our first visit, that, before reaching Kota-Kota, I had come to the conclusion that a large river from the north was not needed to account for the perennial flow of the Shiré. I am sorry I have only native information to give instead of my own direct observations; but, having been confined to work of much greater importance than exploration, the above was all I could achieve when set free.

"As the steward and myself were obliged to try our best during the limited time at our disposal, it may be worth mentioning that we travelled 660 geographical miles in 55 travelling days, averaging 12 miles per day in straight lines. The actual distance along the wavy, up and down paths we had was of course much greater. The new leaves on the trees of the plateau were coming out fresh and green, and of various other hues, when we were there, and on reaching the ship on the 31st of October, we found all, except the evergreen ones by streams, as bare of leaves as in mid-winter.

"P.S. *Shupanga*, Feb. 10, 1864.—The river rose in tremendous force on the 19th of January—much later than usual. Its lateness extracted many a groan from me, for it was plain that I had plenty of time to have examined Lake Bemba, which I suppose to be the beginning of the drainage system which finds an outlet by the Congo. Mofu, or Mofue, was seen, I believe, by Monteiro in his journey to Cazembe. Part of our line of march was along the route from Kilua to the same chief.

"DAVID LIVINGSTONE."

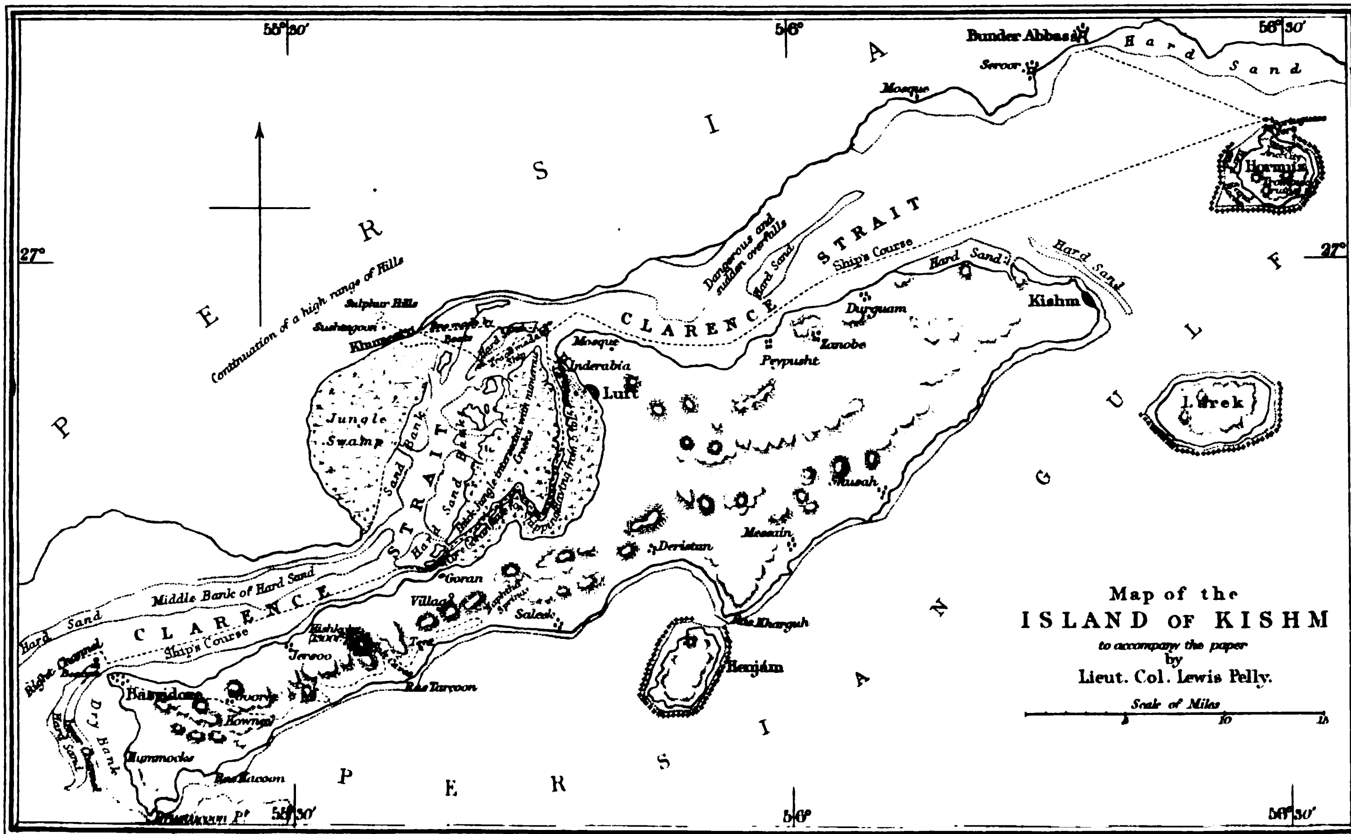
In a subsequent letter to Sir Roderick Murchison, written from Bombay, after crossing the Indian Ocean in his river-steamer *Lady Nyassa*, Dr. Livingstone gives further information relating to his recent expedition:—

"Poonah, 18th June, 1864.

"WE arrived at Bombay on the 13th instant, after a passage of 44 days from Zanzibar. From Zanzibar we crept along the African coast, in order to profit by a current of at least 100 miles a day. If Solomon's ships went as far south as Sofala, as some suppose, they could not have done it during the south-west monsoon against such a current. We went along beautifully till we got past the line; we then fell in with calms, which continued altogether for 24½ days. The sea was as smooth as glass; and, as we had but one stoker, we could not steam more than 9 or 10 hours at a time. By patience and perseverance we have at length accomplished our voyage of 2500 miles, but now I feel at as great a loss as ever. I came here to sell my steamer, but with this comes the idea of abandoning Africa before accomplishing something against the slave-trade; the thought of it makes me feel as though I could not lie in peace in my grave, with all the evils I know so well going on unchecked. What makes it doubly galling is, that while the policy of our Government has, to a very gratifying extent, been successful on the west coast, all efforts on the east coast have been rendered ineffectual by a scanty Portuguese convict population. The same measures have been in operation here, the same expense and the same dangers, the same heroic services have been performed by Her Majesty's cruisers, and yet all in vain. The Zambesi country is to be shut up now more closely than ever, and, unless we have an English settlement somewhere on the mainland, beyond the so-called dominions of the Portuguese, all repressive measures will continue fruitless. I would willingly have gone up some of the other rivers with my steamer, instead of coming here, but I had only three white men with me—a stoker, a sailor, and a carpenter—and seven natives of the Zambesi. The stoker and the sailor had both severe attacks of illness on the way, and it would have been imprudent to have ascended an unexplored river so short-handed. Could I have entered the Juba, it would have been not so much to explore the river, as to set in train operations by merchants and others which shall eventually work out the destruction of the slave-trade."

The following is an extract from a letter of Dr. Livingstone to the late Admiral Washington:—

"THE Mission of the Universities has been a sore disappointment to me, but on public grounds alone, for it formed no part of my expedition. Before I left the Zambesi, I heard from Bishop Tozer that he had determined to leave the country as early in the present year (1864) as possible. He selected the top of an uninhabited mountain—Morambala, at the mouth of the Shiré—for his mission-station. Fancy a mission-station on the top of Ben Nevis! It is an isolated hill in the middle of a generally flat country; consequently all the clouds collect round the summit, and the constant showers and fogs at certain times make the missionaries run, to avoid being drenched, into the huts. Unlike the first, the second party has been quite useless; they never went near any population that could be taught, and are now about to run away altogether. Wishing to be strictly accurate as to the incredible fact of a missionary bishop without a flock, I made minute inquiry and found that on the mountain there were three native huts at one spot, four at another, and nine at a third; but none, except the first three, within easy access of the station. Twenty-five boys whom we liberated, and gave to the late Bishop Mackenzie, were very unwillingly received by his successor, although without them he would have had no natives whatever to teach. He wished to abandon certain poor women and children who were attached to the mission by Bishop Mackenzie, but Mr. Waller refused to comply with his proposal, and preferred to resign his connection with the mission. In reference to a promise by the Government of Portugal to send out fresh instructions to the Portuguese officials to render us every assistance, which was made in answer to Lord Russell's remonstrance to the authorities at Lisbon, we have only a fresh imposition, in the shape of a tax for residence at Quillimane, on Dr. Kirk's party. It amounted to between 7*l.* and 8*l.*, which, of course, I must pay. The duty of 4*d.* per pound weight on calico seems to say, 'We Portuguese mean to seal up the country more closely than ever.' I never intended to make use of the Zambesi after getting the steamer on the Lake. I only thought, as we had discovered this opening, we ought to make use of it to get up there, and then send out ivory by the Rovuma, during the eight months of the year that it is navigable. I



Published for the Journal of the Royal Geographical Society by J. Murray, Albemarle St.

regret not being able to finish what I had begun. I thank you for the charts of the Rovuma, and shall endeavour to take soundings, not on the bar, for there it none, but opposite the mouth. The only thing like a bar is a phenomenon which occurs at half-ebb, and up to the time when the tide turns, at which period the water, rushing out of the river, falls from 3 or 4 fathoms into 19 fathoms, and thus causes a commotion which might swamp a boat. It lasts, however, but a short time, for as soon as the flow begins all is smooth again. I believe that the Rovuma may be navigable for a vessel of light draught eight or nine months out of the twelve, and the bay is perfectly safe, and magnificent.

"DAVID LIVINGSTONE.

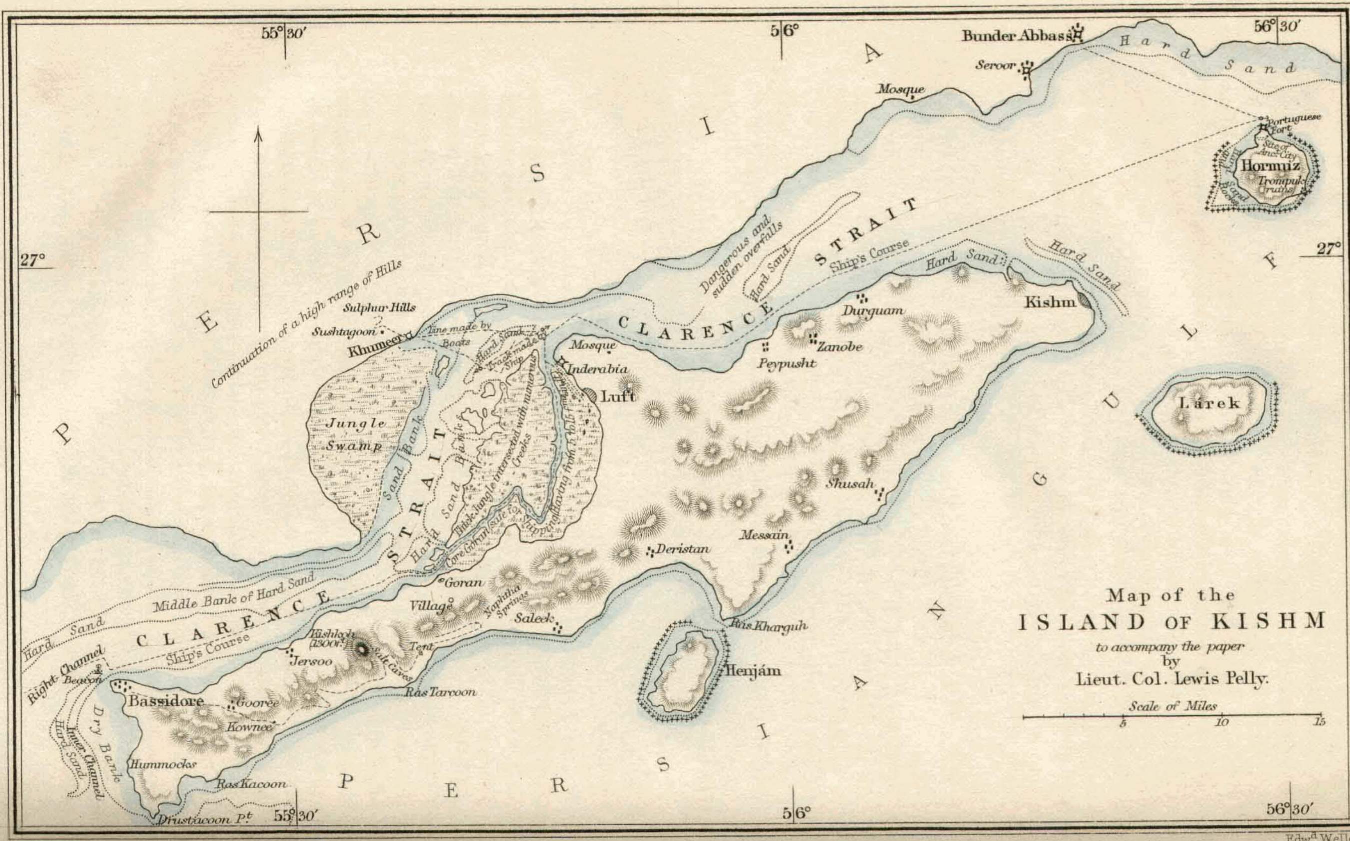
"P.S. 24th Feb. 1864.—The Bishop is off before me. I take the boys and children (40 in number) whom he wished to abandon, and send them myself to the Cape. Having once liberated them, I felt in honour bound to see them secure from a return into slavery, and am sure that the gentlemen who sent out the mission would have done the same."

XVII.—*Visit to Lingah, Kishm, and Bunder Abbass.* By Lieut.-Col. LEWIS PELLY, Acting Political Resident, Persian Gulf. (Communicated by the Secretary to the Government of Bombay.)

Read, June 27, 1864.

I LEFT Bushire in December, 1863, and landed at Lingah, whence I came on to Bassidore, visiting the salt-caves and naphtha-springs on the island of Kishm, and so, passing down the Clarence Straits, touched at Khumeer to see the formations of sulphur and red ochre, and thence crossing to Bunder Abbass, awaited there the return of the mail steamer to Bushire, visiting in the meantime the island of Hormuz.

Lingah contains a fort, and is surrounded by an unwalled town of stone, flanked on either side along the shore line by a series of clusters of houses, overhung with date-trees. The roadstead is open, and though sheltered from the north-west, is dangerous for shipping during the prevailing south-east and south-west winds; but a solid masonry breakwater affords protection to small craft. Lingah may be some 25 miles distant from Bassidore in a north-westerly direction, and is the chief-town of a district lying immediately between the sea and the barren and precipitous mountains which lead up through Lar, and so on to the Shiraz road. The district touches the Sheikhdom of Moghoo on the north-west, and



Map of the
ISLAND OF KISHM
to accompany the paper
by
Lieut. Col. Lewis Pelly.

Published for the Journal of the Royal Geographical Socy by J. Murray, Albemarle Stt London, 1864.

extends south-east almost to Bunder Mollum and the region farmed under Bunder Abbass by the Sultan of Maskat. About 4 miles south-east of Lingah lie the ruins of the Portuguese fort Kong. Portions of what seems to have been the factory and a half-moon casemated battery are still standing close to the water-line, as are also the ruins of a breakwater, from which probably the idea of that of Lingah was taken. The produce of the district consists of dates and some barley and wheat, sufficient for home consumption. The Sheikh of Lingah is an Arab, and claims to be a descendant of a family that emigrated to the Persian Gulf at the period when the Arabs were at the height of their power at Baghdad. He is, I believe, related to the Rasulkhymah Chief on the opposite coast. No import or export duty is due in Lingah, and it is probably to this fact, and to that of geographical position having preserved the port from governmental interference, that its hitherto prosperity is due. At present the township, with its adjacent suburbs, may contain from 8000 to 10,000 inhabitants, of whom the bulk are evidently Africans. The wealthier class are Persianised Arabs, and some Persians also have been attracted from the upper country for labour on the spot, or as carriers into the interior. There are also some twenty Hindoos residing in the place as agents for firms in Bombay or Kurrachee. It appears from this statement, as well as from the conversation of the merchants themselves, that the little commercial importance of this place is due to its being conveniently situated as a point of agency for trade coming from India and seeking a market along the Arabian coast of the Gulf, and to the Persian territory in the immediate neighbourhood of Lingah and towards Lar. Goods are landed, and, if prices pay, are sold on the spot and are sent towards the interior at the risk of the purchaser. Lingah merchants consider the road through the Eliant haunts too insecure to permit of their trading themselves with the interior. It is, however, I think, obvious that, unless owing to accidental circumstances, Lingah, from its geographical position and from its dangerous anchorage, would be quite unable to compete with the inland trade of Bushire or Bunder Abbass; and its statistics show that the bulk of its trade is with the maritime Arab ports, goods being reshipped thither in small coasting craft, according to demand and opportunity. Specie and pearls, and perhaps a little salt-fish, are, I believe, the only returns from the Arab ports. About eight or ten boats are engaged at Lingah for the pearl-fishery. There may be some 150 native craft of all sizes belonging to the people of the place; and it is remarkable that, although labour is cheap and efficient in boat-building along the western coast of India, yet the builders at Lingah prefer to import their wood from India and build their buglas (which seem of capital construction) on their own beach.

From Bassidore I crossed the island of Kishm to visit some salt-caves and naphtha-springs. The road, after leaving a ledge of rock on which Bassidore is built, descends a few feet into a plain, sprinkled here and there with a few date-trees, and passes the ruins of an old Portuguese fort, situated on a detached rock and overlooking the Clarence Straits. After some 7 miles you reach the village of Gooree, and thence wind among low hills for about 5 miles more into the plain of Kownee, distant only a mile or two from the southern shore. Leaving Kownee you pass eastward along a valley towards a range of dark-red hills: these form the salt-range. The general formation of the island, which, like that extending all along this and the Mekran coast to Kurrachee, is a coarse sandstone grit and conglomerate, overlying blue lias marl,* now suddenly ceases, and the salt formation, which seems to extend some way into the interior of the island, abuts on the shore line, with which it runs parallel at a few hundred paces' distance for some 5 miles, when it again abruptly turns inland. The general aspect of the range is dark-red, alternating with slate colour, strewed in part with earth. The scarps are steep, and the height of the summits may vary from 300 to 600 feet. The entire range seems to be salt, and reminded me of the salt-hill near Nishapoor, on the road from Tehran to Meshed. The two sets of salt-caves which I visited were respectively at the two extremities of the shore-face of the range. The cave on the side nearest Kownee is comparatively small, and does not seem to be worked; but one of the caves on the further extremity is of truly noble proportions, being a vault of from 200 to 300 feet in height, of about the same length, and with a span of 60 or 70 feet. The entire arch of the cave is beautifully streaked, like marble, while large crystalline salites hang from the roof in festoons white as snow.

Another cave of smaller dimensions is in the immediate vicinity, and it is this one which is principally worked. It may be about a mile distant from the beach: a sufficiently good path for camels and donkeys leads up to it. The blocks of rock-salt quarried from the interior of the cave are laid in heaps at its entrance, to be carried by donkeys and camels to the sea-shore, where they are stowed in small native craft and carried to Maskat, for ultimate exportation to Calcutta and the east coast of Africa. The period of working is said to be about five months in the year, beginning from the early spring, when from 100 to 150 hands may be daily employed. The reason alleged for not working for salt during the remaining months of the year, is that boats cannot lay in shore for landing unless during the calm season; but I rather suspect that

* I speak of the prevailing character of the region, a good section of which is laid bare in the cliff at Munora Point, near Kurrachee.

the working is regulated by the demand. Every boat shipping salt pays two *krans*, or about one rupee per ton, to the Sheikh of Kishm, and every camel employed in carrying pays 5 *krans* per annum to the same authority. It is said (and from the general appearance of the place it seems certain) that working in them is dangerous, on account of the frequent falling of large blocks of salt from the roof and sides. Many labourers are said to have been killed in this manner; and among other numerous *débris* I noticed one solid mass of pure rock-salt, about 12 feet thick, with sides of 16 feet, which had recently fallen across the centre of the cave. It does not appear that the pure salites above mentioned are made use of, although I found the few specimens that I gathered to be the best and purest table-salt I ever tasted.

No fresh-water is found in the immediate vicinity of these caves: the labourers collect their drinking-water from a brackish well and one or two artificial rain-water tanks about 2 miles distant. The water that we drank, while pitched there, was brought from wells dug close to the base of the Kownee salt-range.

Leaving the salt-range and still following the shore-line eastward, the general formation of sandstone and blue lias is at once resumed. The valleys run parallel with the coast-line, and the strata rise on either hand in almost perpendicular scarps to the height of 100, 200, or 300 feet, topped with overhanging ledges of grit. It seems, indeed, as though the island had originally been a continuous table-land, which the scourings of the scanty rain, and prolonged exposure to the wind and atmosphere, had gradually broken into a series of gulleys and eventual valleys. The appearance of this side of the island is parched and barren as that of the Persian coast in general.

Passing along one of these valleys for about 6 miles, and about 3 miles before reaching the village of Saleek, a little inland, lie the naphtha-springs. I collected two bottles of the liquid in the stream, and it seems of average burning quality. The springs are, however, scant, and I should think of little value to trade.

Returning to Bassidore, I embarked again on the schooner and passed down the Clarence Straits through the narrow Kishm Channel. After a few miles the strait contracts to a breadth of a hundred yards or so, and winds for a distance of about 21 miles between low islands and banks covered with babool, and fringed below the water-line with mangrove. A creek then turns abruptly to the right and leads up to the small town of Luft. This township lies close to the shore at the foot of a scarped slope, the scarps being strengthened at their crests by curtains and flanking works. At the furthermost side of the town is a square fort, with circular towers at the angles pierced for guns. The present inhabitants seem entirely ignorant of the history of these fortifications; but from their construction and masonry I suppose them to be European.

Like the rest of the island of Kishm, Luft is farmed by the Sultan of Maskat, and is sublet to a Sheikh for about 1500 rupees per annum. It may contain 400 or 500 inhabitants, who seem entirely dependent for trade on the wood, which they collect on the neighbouring islands and re-export to all points round the Gulf, for whose firewood consumption the shores of the Clarence Straits form the natural store. Here, as at Bassidore, drinking-water is principally obtained from vaulted rain-water tanks. These tanks all along the coast-line seem of one construction, being oblong or circular vaulted masonry reservoirs cut in the soil at the foot of slopes. At Luft fort, however, there are also several wells cut deep through the sandstone, and from which water is obtainable when the tanks are dry.

Leaving Luft I crossed the Straits for Khumeer to visit the sulphur-mines, which are dug in a hill about a *fursac* inland from that township. The works are some height up the seaward face of the mountain, and pierce into the strata in long irregular galleries. The ore is brought out in small pieces, which are piled conically in kilns. These are ignited, and the sulphur falls through an aperture into a receptacle immediately below the centre of the kiln, where it is crystallised, leaving a conical refuse of white lime or gypsum. The sulphur-diggings are farmed by Maskat, and sublet to a Sheikh for 4100 *krans*. The Sheikh further pays a sum of 2400 *krans* in presents to the Persian authorities. The outlay of sulphur varies from 60,000 to 90,000 *muns* of 9 lbs. The lime is said to be of an excellent quality, and fetches about two rupees for 1000 *muns* of 9 lbs. when delivered on the sea-shore. The Sheikh told me that he re-lets the diggings in numerous sections, and that his own profit amounts to about one *kran* on the Delhi *mun* of 28 lbs. of sulphur. Khumeer itself consists of a township and fort, very similar in dimensions to that of Luft; indeed all the townships along this coast-line may be described as a cluster of flat, oblong stone boxes round a tumble-down stone fort, and with an outskirting of temporary date-leaf huts. Several craft were lying on the beach of various sizes. Along this shore, as indeed along all the shores of the Straits, are a series of slight fishing-stakes, fixed at low-water mark, and formed of strips of the date-leaves, neatly tied together. Fish, with dates, and a little coarse barley-bread, constitute the main food of the people. The fish most common and most relished is a large sort of mullet; soles and pomplet are caught, but do not seem to be much appreciated.

Leaving Khumeer the Straits widened to a breadth of 4 miles, and on the Persian shore-line a salt formation, apparently a continuation of that on the island of Kishm, crops out immediately on the water-line to a height of about 600 feet, and turns eastward, following the line of the Straits for about 6 or 7 miles in a series of low hillocks of from 100 to 200 feet.

From the Straits I passed to the Island of Hormuz, visiting the ruins of the old Portuguese settlement. The fort, of solid masonry construction, is still standing, but is quite unrepaired. A few useless guns, bearing date the early part of the eighteenth century, lie about the bastions. Three sides of the fort are washed by the sea, and the side facing inward is strengthened by a wet ditch, cut entirely through the narrow neck of land on which the place is built. It seems that during the occupation of the Portuguese a small inlet of the sea on the eastern side of the fort had sufficient depth of water for vessels of considerable tonnage to lie immediately under the wharves. This inlet is, however, now filled up.*

The other side of the ditch forms the apex of the town, which stretched in an irregular triangular form along either coast-line, and till it reached a range of hills, forming at once the base of the triangle, and a natural wall of defence. The length of the perpendicular from the fort ditch to these hills may be about a mile and a half, while two towers, still standing, at either extremity of the base immediately above the beach, and marking the limits of the town, may be about two miles apart. The western of these towers still bears the name of Urgazee, and the eastern one that of Meshshateh. Outside the latter, and stretching south-eastward, seem to have been suburbs parallel with the shore-line, and leading down to a pier distant three or four miles. This pier and suburb, which bear the name of Trompuk, are alleged to be still standing, but I had not the leisure to visit them.

It is impossible to guess what may have been the greatest extent of the city of Hormuz at any one time. Tradition of course asserts that it covered the entire extent above defined, but I infer rather that the original Persian settlements may have been those which now bear the above ancient names; that afterwards, perhaps, the Arabs on taking possession had their Bunder at Trompuk; and that, finally, the Portuguese preferred the point where their fort now stands, because it was at once naturally protected, the nearest position to the old landing-place on the mainland, which

* I find that along the Bunder Abbass shore-line numerous creeks are silted up. To the northward on the contrary, for instance, on the Bushire peninsula, and, I believe, also on the opposite Arabian coast, there are signs of the land being constantly caved away by the sea. Near the fort of Reshire the section of soil laid bare along the beach-cliffs shows the débris of pottery for a considerable distance, and to a depth of 5, 6, or 7 feet. Some wells caved in still hang their sandstone apertures over the cliffs, and absolutely overhang the sea at high-water.

stood near the present Bunder Abbass;* and because, thirdly, it admitted of the closest approach of vessels of tonnage, and at all times afforded shelter on either one or the other side of the fort.

Immediately opposite the Hormuz Fort on the mainland, and about four miles to the eastward of the present Bunder Abbass, are the traces of a small ancient creek, now silted up; some masonry work is still visible. It is at this spot that goods are said to have been shipped for, or landed from, ancient Hormuz. There are many traces of other small creeks along the shore-line, one in particular close to Bunder Abbass, and which has silted up in the memory of man. It was probably the presence of this latter creek which caused the present Bunder to be placed where it is, otherwise it would have been obviously much better placed some miles to the westward beyond Seroor, where a spit of land and the Kishm Island give much greater protection against the prevailing winds.

The description which old writers hand down to us of the splendour of Hormuz should, I think, be accepted with considerable care. For the period it was, doubtless, a first-rate emporium, but would at present, perhaps, be considered an ordinary oriental town. There are no traces of any ruins of either great extent or solidity. The most durable structures seem to have been their vaulted water-tanks, which of course, in a populous town wholly dependent on rain-water, were both numerous and of vital importance. The statement of Justamond,† that water was hawked about the streets on camels for the convenience of passengers, shows not that the town enjoyed an additional luxury, but that a necessary of life, which is elsewhere freely used, possessed a market-value in this utterly desolate island. I find it also difficult to credit that the thoroughfares tramped by camels were likewise spread with carpets and linen, since such an arrangement would not at all suit the habits of those animals. It is more probable that the old shops of Hormuz, like those of other eastern towns, were shaded by strips of awnings, with bits of carpets, for the transaction of business.

A local tradition alleges that the island of Hormuz was an appanage of the old Persian town of Minao, situated on the mainland, on the banks of a fresh-water river, immediately east of Hormuz. Minao still bears its old name, which is said to be derived from the words Min and Aub, that is to say, land and water, *par excellence*. The fact is, as a merchant of Bunder Abbass said to me, that mankind settled in the first instance on fertile land, and by the margin of sweet water; and wherever you

---

* Four miles east of Bunder Abbass.

† *Vide* Extracts from Justamond and Ralph Filch, p. 30, 'Government Selections,' No. XXIV. of 1856.

find these two essentials in the neighbourhood of other ruins, you may be sure of their claims to the priority of age.

As to the general character of the island of Hormuz, it seems to be very similar to that of the salt and sulphur formations in the neighbourhood of Khumeer, already described.

Leaving Hormuz, I sailed across to Bunder Abbass, distant about 12 miles, in a north-westerly direction. It is a walled township of about 8000 or 9000 inhabitants, with suburbs, extending along an open sea-beach, backed at a distance of about 15 miles, by a range of lofty and apparently desolate mountains, although the clefts in the middle slopes of this range produce excellent oranges,* and are said to be otherwise studded with trees. Behind the present town are some large tombs of superior construction, but they are falling into ruins. To the westward lie the débris of an extensive former town, and among them the ruins of an English factory, which seems to have been in the first instance pulled down, to prevent its being used as a point of attack by any hostile force. A better and more sheltered position for a port lies about four miles to the westward, at the entrance of the Clarence Straits, which is said in former times to have been the site of a small Bunder. The present Bunder Abbass is destitute of any pier or other artificial improvement, and has only from two to three fathoms of water at a distance of two miles out, so that during the frequent southerly or south-eastern winds it becomes a lee-shore lashed by a heavy surf, rendering it necessary for craft to seek shelter under the islands of Hormuz and Kishm.

XVIII.—*On the Comoro Islands.* By Captain ALGERNON DE HORSEY, R.N.

Read, June 27, 1864.

THE Comoro islands are four in number, and lie nearly midway between the northern extremty of Madagascar and the African coast; Comoro, the largest and highest of the four, giving its name to the group. The others are named respectively, Johanna, Mohilla, and Mayotta, and are all high and of volcanic origin. These islands, except Mayotta, are generally safe of approach for ships, having clear passages between them.

Comoro Island.

Comoro (also called Angazecha) is the northernmost as well as the largest and highest island of the group, its dimensions being

* Some of the finest sorts of oranges at Zanzibar are said to be grafts from the trees in this mountain range.

supposed to be about 35 miles north and south, by about 12 miles east and west. This island is less known than the other three, and even its form is very inaccurately defined: the slightness of our knowledge of Comoro is probably owing to the fact of its not possessing any harbour, nor, as far as we know, a single good anchorage.

Comoro, unlike Johanna and Mohilla, is not under the dominion of a single Sovereign, but is divided into several districts, which each acknowledge an independent chief or Sultan: these petty sovereignties are frequently engaged in war with each other. The natives are a fine race, and of remarkable stature: they appear to be of Arab descent, with an intermixture of Madagascar blood.

There are several towns on the coasts of Comoro, of which the principal are Maroni and Itzanda, on the west side of the island, and Mouchamouli at the N.W. extremity.

Maroni Bay is in lat. 11° 40′ 44″ S. The town of Maroni is situated at the head of the bay; it is large, and surrounded by a wall; the huts are generally detached, and the streets narrow and dirty. Besides the huts there are several substantial stone buildings. The Sultan of Maroni is the chief of most influence in Comoro, although I believe the district subject to his authority is not large.

Supplies are cheap and plentiful, particularly cattle, which are exported to the other Comoro islands. Water, however, is very scarce all over the island.

Itzanda Bay and Town are about 3 miles northward of Maroni, the two bays being somewhat similar. Itzanda is governed by an independent chief, who does not, however, possess any importance. The town is walled in like Maroni, and is of about the same size.

Comoro Mountain is situated at the south part of the island, its highest part being about 8 miles from the southern extremity. The mean of my observations gave its height to be 8526 feet. The summit of this mountain is smooth and dome-shaped, rising so evenly from the sea on its south side as to give a deceptive idea of its altitude when close to. Its stupendous height will show better at the distance of 25 or 50 miles, and in clear weather it may be seen at more than 100 miles. The upper part is generally obscured by clouds, which occasionally roll away, disclosing the smooth, dark summit at an unlooked-for height, somewhat similar to Lord Dufferin's description of the appearance of Jan Mayen. This mountain is the more remarkable from the absence of any land of equal height on the opposite coast of Africa, and also on account of its being the highest mountain in the world, *as compared with the size of the island.* Nevertheless it has remained, I believe, to this day unnoticed by geographers in their comparative tables of mountains.

Comoro Mountain, and, indeed, the whole island, is volcanic; an eruption is said to have occurred about the year 1830, and again in 1855. In this latter eruption the lava issued from several old places, and also on the more eastern part of the island; it then had the effect of driving several dhows (native vessels) on shore, and of casting a great quantity of fish upon the coasts. Another eruption took place in 1858, on which occasion the lava flowed out of the side of the mountain into the sea on the west coast, between the towns of Maroni and Itzanda, which, being only 3 miles apart, thus narrowly escaped destruction. We saw on our visit in 1861 the lasting effects of this eruption; all trace of vegetation was destroyed where the stream of lava had passed, and a projecting black point of scorious lava, which previously had no existence, had been formed about a mile to the northward of Maroni.

At the south-west point of Comoro ignited sulphurous vapours are said frequently to issue from the crevices in the ground, shewing lights at night to vessels when passing close. The popular belief among the natives is that this part of the island is inhabited by devils, and they will on no account venture in the vicinity at night.

Mohilla Island.

Mohilla is the smallest and least elevated of the Comoro islands, being about 15 miles north-west and south-east, by 7 or 8 miles wide at its broadest part, not including some small islands at the south-west end which extend rather more than 3 miles from shore. Mohilla is about 1,900 feet high; on the east side the land is low near the sea, rising gently to the mountainous ridge running along the middle of the island, which has no peaks, and appears capable of cultivation to its summit. The island is well wooded, the hills being covered with trees to the very top.

Mohilla is at present governed by an independent Queen, who is a niece of Radama I. of Madagascar, and was educated by the French. She is married to a Zanzibar Arab of low caste.

There are two principal towns in Mohilla, viz. Douāny and Numa-Choa. Douāny is a brown, dull-looking, walled town close to the beach a little to the southward of the north-east extremity of Mohilla; it has a solid rampart or platform for a battery of guns along its sea-face. The Queen's house is near the north-west corner of the town, facing the beach, and has rather the appearance of a casemated barrack. It is in lat. 12° 17′ 43″ s., long. 43° 46′ 42″ E. The natives are a peaceably-disposed people, very similar to those of Johanna; the population is not large. The island is very fertile; coffee and spice trees grow luxuriantly in a plantation belonging to the Queen; cocoa-nuts also abound. Cattle are good and cheap.

Johanna Island.

Johanna is next to Comoro in size and in height, but far surpasses it in beauty and fertility. In form it is triangular, the east side running about north and south, and the north side forming a deep bay, in which is situated the town. This island, as seen from the westward, has been aptly compared by Captain Nolloth to a schoolboy's "comparative view of the mountains of the world," being a succession of peaks one rising behind the other, and all, including Johanna Peak, being wooded to the top.

Johanna is governed by an independent Sultan, who resides at the town on the north side. The natives are hospitable and well-disposed, particularly to Englishmen, whom they have long been accustomed to look up to as their protectors and advisers when in difficulty. They are of Arab origin, but the lower orders are much intermixed with the African race. The slavery in this island is of a very mild and domestic form, the authority of masters over their slaves being in many cases almost nominal. The population of the island in 1862 did not probably exceed 10,000 souls, including slaves, and of that number nearly a tenth were carried off in the same year by cholera, which appears to have been brought from Mauritius.

The climate of Johanna is on the whole healthy, the shores being nearly everywhere free from mangrove-swamps. The cruizers on this station generally consider this island a sanitarium, as compared with the other parts of East Africa.

Johanna Peak, by the mean of my observations, is 5,177 feet above the sea; it is in about lat. 12° 14′ 17″ s., long. 44° 27′ 34″ E., near the centre of the island, being about 5 horizontal miles from Pomony, and 3 from Johanna Town. This peak is of conical form, and probably a thousand feet higher than any of the other ones which surround it. Except in the early morning it is rarely to be seen, being obscured by clouds. From the peak a spur of mountainous land projects towards each of the three ends of the island. Johanna is, like the other Comoros, volcanic, but not actively so now; the traces of former eruptions are very distinct close outside the town of Johanna, where vast accumulations of cinder may be observed cropping out on the road-side.

There is a lake, probably the crater of an extinct volcano, at a considerable elevation in the mountains at the back of Pomony. Four of H.M.S. *Brisk's* officers ascended with some difficulty to this lake, but had not the means of corroborating the native report of its being fathomless. The Johanna men hold this lake in superstitious dread, and affirm that there are porcupines, alligators, and extraordinary birds without wings in its vicinity.

Johanna Town, also called Moussamoudou, is on the north side of the island in the depth of the bay, about 10 miles from Saddle Island, and about 6½ from the north-east point. The south-west angle of the town is in lat. 12° 9′ 50″ s., long. 44° 25′ 51″ E. The town, which is on low ground close to the sea, is substantially built of stone, with very narrow winding streets, and is surrounded by a wall: it is overlooked by a dilapidated fort or citadel, on a height immediately behind it. The English consulate is a detached building close to the beach, about 300 yards to the westward of the town.

Pomony Harbour is formed by coral-reefs, and situated on the south-west coast of Johanna, about 8 miles from its southern extremity, and about 12 miles from Saddle Island. This harbour is very small, but has good depths of water, and forms a secure anchorage for vessels not exceeding 200 feet in length; at low water the surrounding reefs become dry, and the harbour then resembles a dock.

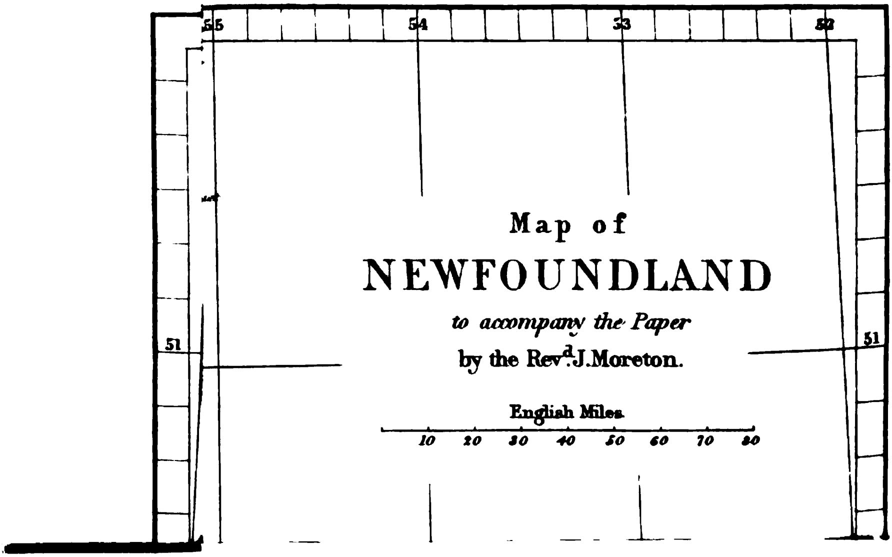
Trade.—The exports and imports of Johanna in 1856 were estimated at under 10,000*l.* a year, of which full half is accounted for by the produce of a sugar estate at Pomony, the property of H.M. consul of these islands. There is not much land suited for the growth of sugar, owing to the mountainous character of the island, but what has been produced is of excellent quality. Coffee has but lately been cultivated: the climate and soil are well adapted for it.

The ship arrivals amounted to 50 or 60 a year, principally whalers touching for refreshments. These vessels are charged 15 dollars a year for recruiting and watering as often as they please: other merchant-vessels touching here pay 10 dollars port dues.

Supplies are plentiful at Johanna: the small hump-backed cattle, similar to those of Aden, are of excellent quality, at a cost of 10 to 15 dollars a head. Fowls are also small but cheap. Sweet potatoes, yams, cocoa-nuts, and also fruits and other refreshments, are abundant. A small supply of provisions and coal is kept at Pomony for the use of H.M. ships in the Mozambique.

Mayotta Island.

Mayotta, next to Johanna in dimensions, lies to the south-eastward of that island, leaving a channel between it and the outlying reefs of Mayotta 29 miles wide. This island is of irregular form, 21 miles north and south, with an average breadth of 6 or 7 miles, but if we include the dangerous coral-reefs which surround the island, the whole occupies a space of 30 miles north and south, and 24 miles east and west, and is contained between latitudes 12° 34′ and 13° 4′ s., and between longitudes 44° 59′ 15″ and 45° 23′ E. The island is remarkable from all points of view; owing to its very uneven surface: volcanic-looking peaks rise in


55
54
53
52
51
51
Map of
NEWFOUNDLAND
to accompany the Paper
by the Revd. J. Moreton.
English Miles
10 20 30 40 50 60 70 80

all parts, the highest of which is Mavégani mountain, which is situated 7 miles from the southern extremity of the island; it has two peaks close together, of which the westernmost is the highest, being, according to the French Survey, 2164 feet above the sea. The most remarkable mountain is Uchongui, a sugarloaf-peak, which rises at less than 3 miles from the southern extreme of the island, and is said to be 2105 feet above the sea.

Mayotta is said to contain about 8000 inhabitants, of a race similar to the other Comoro islanders. It is now a French colony, a small military and naval establishment, having been formed at Zaudzi some years ago. The island is capable of cultivation in most parts: eight sugar-estates on the eastern side are worked with profit, although labour is in great demand.

In 1855 there was no cultivation on the western side of the island, but roads were being made to it.

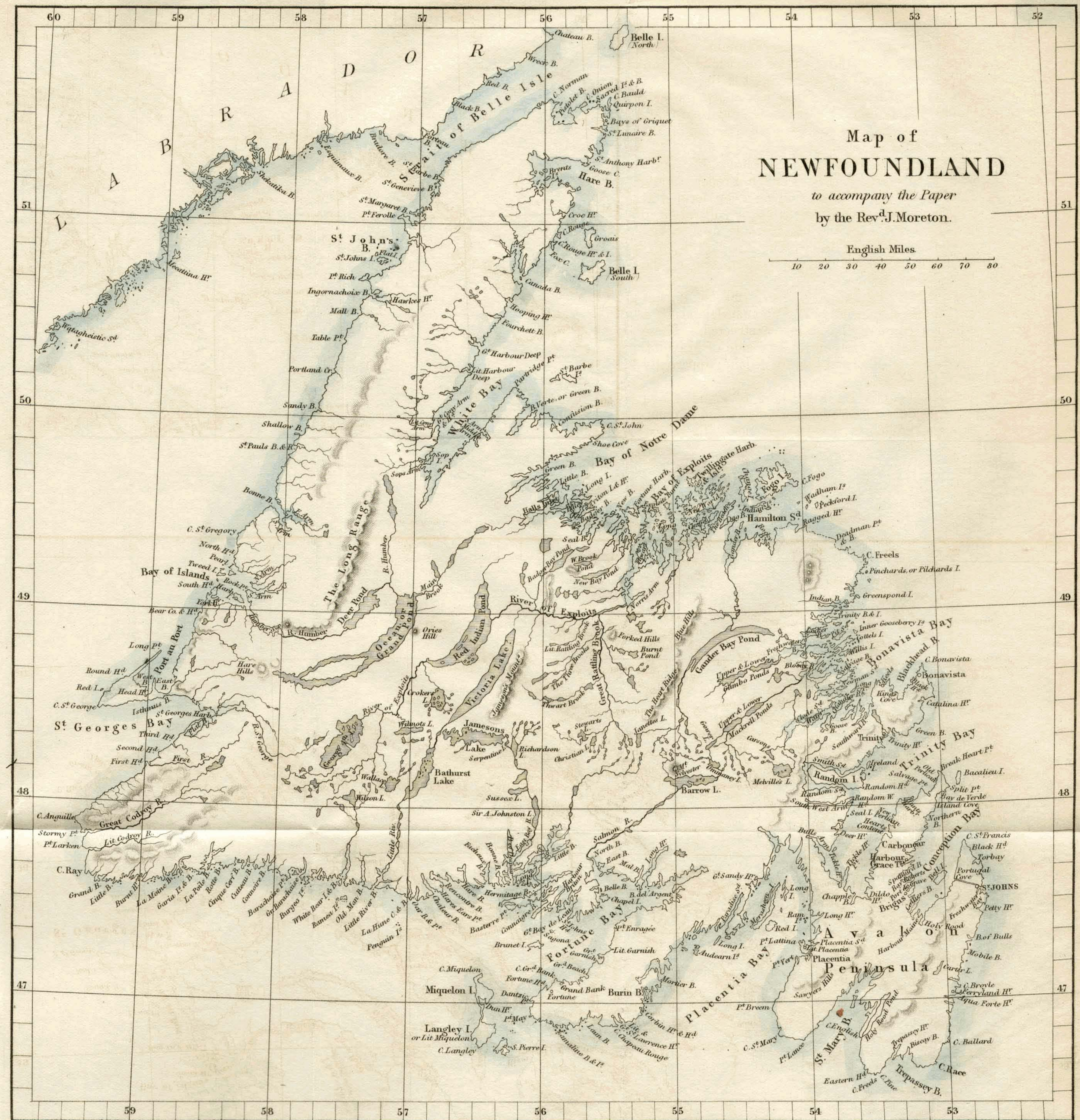
Zaudzi Island, in lat. 12° 46′ 48″ s., long. 45° 20′ 14″ e., lies to the westward of, and is connected with, Pamauzi Island by a neck of sand, on which a causeway has been constructed. These two islands lie inside the chain of reefs on the east side of Mayotta. At the north-east extreme of Pamauzi there is a lake, apparently the crater of an extinct volcano.

The French establishment is on the island of Zaudzi, and consists of a governor, colonial officers, some artificers and seamen, and about 100 soldiers, besides a few native ones. There are several substantial government-buildings and storehouses, and numerous huts. A supply of provisions and coal is kept here for the troops, and for the French cruisers on this station. The water on Zaudzi is scarce and not good; the establishment is supplied from the main island.

The climate of Mayotta has the reputation of being very unhealthy; the shores of the main island are lined in places with mangrove-swamps, which uncover at low water, and are productive of malaria and fever. In this respect, as well as in others, Mayotta differs from the other Comoro Islands, which are generally considered healthy.

XIX.—*Some Account of the Physical Geography of Newfoundland.* By Julian Moreton, Colonial Chaplain, Labuan.

This country presents a nearly plane surface of heaths, fens, and ponds, with some ranges of hills rather than mountains near the coasts, which are much higher in the south and west than on the eastern side of the island. The highest headlands to the westward are about 1100 or 1200 feet. On the east coast they are lower:



Published for the Journal of the Royal Geographical Society by J. Murray Albemarle Street. London. 1864.

Edwd. Weller

300 feet is about their average height. Ponds or lakes and small brooks are numerous among the hills, and the scenery is beautiful, but not grand. There are but two streams deserving the name of river; they are the Great and Little Codroy Rivers; the former navigable for 15 miles, the latter for only 6 miles, from the mouth upward. Large rocks in the channel impede the passage of any craft larger than a two-handed flat in almost all the other streams. One large lake named Ocean or Grand Pond, an island in which is reputed to have been the last retreat of the now extirpated Red Indians, is situate in the interior country, not far from the head of the Bay of Islands. A gentleman who crossed part of the country in 1853, entering at St. George's Bay and emerging at Hall's Inlet, spoke of large lakes upon which he performed great part of his journey, he having a boat with him. One of these lakes was nearly 40 miles long. From the course the traveller took, this largest lake must be the Ocean Pond; and his account agrees with and confirms that which I received from an old furrier, from whom I learned many particulars of the country. In the eastern part there are some very large ponds, which are reported by the fur-hunters to be all connected by brooks. These ponds are Gander Bay Pond, Upper and Lower Gambo, Upper and Lower Mackrell Ponds, and Clode Sound Water. Upon the Gambo and Mackrell Ponds I have travelled. The Gambos are two sheets of water, 18 miles in their united length, connected by a brook. The two Mackrell Ponds are very similar to the Gambos in form and size, but lie further inland, the Lower Mackrell being parallel with the Upper Gambo. Fur-collectors frequent the shores of these ponds, and are almost the only persons, beside the Micmac Indians, who really know anything of the interior. From these persons I learned that the country within was similar in character to a part which I traversed a few miles inside Cape Freels. Towards this cape the hills decline, the country becomes for a space of many miles very low and level, and there is a large break in the line of forest. The whole plain is swamp and heath, with frequent spots of bare granite rock protruding, and here and there a small grove, or, as the country people term it, "droke," of very stunted, blight-stricken fir-trees, none of them of larger growth than firewood. In 1851 some Indians crossed the island from Bay Despair to Freshwater Bay. They were 9 days in the interior, having stayed by the way to kill and eat venison, and spent time in the desultory way which is usual with their race. It was reckoned that they might have come across in 6 days. From this I judge that the character of the country does not present much difficulty in the journey. An old furrier, who had spent years in fur-collecting about the country between White Bay and Bay of Islands, told me when I was intending a journey thither, that I

might travel from the head of White Bay without difficulty the whole distance in 3 days; and this supports the same conclusion. All that I have learned disposes me to believe that the central parts generally resemble the open lands near Cape Freels.

There is very much bare protruding rock in all parts of the island, presenting everywhere a rounded, worn, and water-washed appearance, such as could be produced only by their having once been part of the bed of ocean. Large boulders, of stone of different character from all the rock around, are lodged in all parts; some of the most remarkable are upon the highest lands. A recent, and I suppose still proceeding, uprising of the whole island from the sea is very observable, and many proofs of it have been brought to my notice. For instance, a narrow tickle at the head of Greenspond Harbour, in which the water now is scarcely deep enough for a punt's passing, was, in the memory of aged people, sufficient for the passage of large fishing-boats called Shallops. At Pinchard's or Pilchard's Island, and in Twillingate Harbour, rocks now above water are remembered as formerly sunken rocks, over which it was possible and usual to row small boats. In many places, from the same cause, the fishermen cannot now let their boats ride in the same water where their fathers were wont to moor them. I have been told of similar changes in Trinity Harbour. The prevalent kind of rock is a very dense grey granite, but there is upon an island in Conception Bay a quarry of very fine freestone. Copper, iron, and lead are known to exist in many places; generally in quantities too small to pay for working, though in one part to the westward some good success has been obtained in mining for both copper and iron. Manganese ore was found near the same place, but so impure that it would not pay for working. During the last five or six years diligent search for minerals has been made in the east and north-east, by competent persons and at much expense. Specimens have been shown of metals found; but the only real success, the only discovery at least which was followed up by a mining adventure, was a large vein of lead, of very pure quality, in Bay Bulls Arm, Trinity Bay, which was worked in 1860-1, very profitably I believe, by some American capitalists. In the midst of success the work was suddenly ended by, it was said, a failure of the metal: the vein was reported to be lost, and no great search seems to have been made for a further discovery. In Indian Bay there is a warm spring; and in Freshwater Bay I have seen in a pond two springs which always defy the frost, and keep, over each of them throughout the winter, a circular open space, while all the other surface of the pond is coated with very thick ice.

The soil is generally poor and nearly unproductive. In many of the inhabited places, especially on the north-east coast, the only soil is peat, often not more than one foot deep upon the surface of the rock. A few miles within the shore, however, there is a poor, yellow gravel beneath the turf; and in some few places a substratum of clay. With this clay brick-making has been attempted, but not very successfully. Whether the want of success were due to the unsuitableness of the clay, or to want of skill, I cannot say. On the western shore near the Codroy Rivers, I have seen good red marl of many feet depth, and some gypsum.

Great heat and extreme cold are both frequent in Newfoundland. I have noted the thermometer at 136° in the sun, when probably the height in the shade would be 97°; and this, though greater than the usual extreme, was not very infrequent. At the place of my abode, near the centre of the east coast, the winter is seldom known in which the mercury does not sometimes descend to 8° below zero, and I have known it to reach 22°. It is commonly said in Newfoundland, and the remark is near the truth, that the summer is but a three months' season, and all the remaining nine months are winter. Sudden, great, and trying changes of temperature are experienced at all seasons. In summer the western winds, blowing overland, bring extreme heat; but usually, on fine days, unless the land-breeze is strong, the wind veers southward, and before evening brings in fog from the sea; often making fire and additional clothing grateful in the evening of the same day in which the dry heat has been scarcely sufferable. In winter the land-breezes blowing over a great extent of snow-clad country are most severely cold, while those from the sea are mild and damp. With a shift of wind it is not an infrequent thing for the mercury in one night to rise from some degrees below zero to 30° or more above. The cold always becomes many degrees more intense for a few hours before the coming in of a mild wind from sea; the frosty air being repelled, and returned in a dense state upon the land, by the force of the new-coming breeze. The same winds, namely, those from any quarter between south-west and north, bring in summer the greatest heat and in winter the severest cold. For these winds pass over a great extent of land, which is either greatly heated or snow-clad according to the season. A similar remark is correct of the winds from north to south-west inclusive; they are in winter the mildest, and in summer the coldest, because of the fog which they always bring to the shore. An exception may be made to this latter remark, because in March, April, and May, when the Arctic ice is driving southward by the coast, the sea-breezes pass to the land over so vast an extent of frozen water, and cause a biting coldness of the air. But even at these seasons the fog commonly prevails and the atmosphere is damp. Connected with these observations is the fact, that some winters which are very severe in the south of Newfoundland are mild seasons in the north. In those winters the prevailing winds are from north and north-east, which come *from sea* to the north and eastward shores, and pass *overland* to the south parts of the island. By similar reasoning the fact is accounted for that the winters which are mild in the south are severe in the north, the prevailing winds coming then from opposite quarters. The great fog-banks, which seem perpetual at sea, are much more frequent in their visits to the shore of the south than of other parts: a fact which I venture to take in confirmation of the theory that these fogs are generated in the sea south of Newfoundland by the meeting of the Arctic currents and the Gulf Stream. In a small book lately published I have noted, as one principal reason of the severity of climate, the fact that two vast streams of Arctic water, the Davis Straits and East Greenland currents, combine and run by the shores of Newfoundland, and repel the Gulf Stream. Proximity to the vast Canadian continent, where so much land is forest and uninhabited, is a cause capable of some amelioration by the increase of population there; but the former is one which must remain unaltered, and, so far as it is concerned, Newfoundland must ever remain a cold country. It is a common assertion of people in the country that the climate is becoming less severe. This assertion seems unfounded. The winters of 1848-9, 1853-4, 1858-9, 1861-2, and 1862-3 were confessedly severe in the extreme, and the last two almost unprecedented. More provision is now made against the cold, the houses are better, and the clothing of the people more suitable than in former times; yet the rigour of climate seems to have been borne at least as well as it now is, and, indeed, fewer diseases were known then.

There are some beautiful phenomena peculiar to such a climate, which I hope it is not out of place to mention here.

The great frosts of winter cause so clear an atmosphere that the skies, both by day and night, appear in marvellous beauty. The Aurora is remarkable for its beauty and frequent appearance. It seemed to me far finer on the north-west side of Newfoundland than anywhere else. Its colour is usually yellow, sometimes variegated, not often a general red. A man whom I knew attributed the loss of sight in one of his eyes to the Aurora, the rays of which he said were playing quite low upon the water, while he was attending to the sails of his boat. A feeling of something like spider's web across his eye, which he tried to wipe away, was, he believes, the effect of a ray of the Aurora through which he passed, and from it blindness resulted. Whether this is credible or not I am unable to judge.

Mirage is a very usual appearance on the coast: so are very beautiful halos both of the sun and moon.

Scarcely any object in nature can be more strikingly beautiful than what is called "silver thaw," or "glitter;" and this is seen many times in every winter. When rain or thick fog quickly follows a change to mild wind, the water falling upon surfaces which are yet frozen is at once congealed, and thus every object exposed to it becomes thickly coated as with glass. It can be imagined how magnificently brilliant the whole scene becomes when the weather clears and the sun shines; every minute branch upon a tree, almost every blade of grass, if there be any bare of snow, appears a distinct crystal. Once seen it cannot be forgotten.

Thunder-storms are frequent and violent. To my remembrance they seem often heavier than any I have known during 18 months' experience in the tropics. I have seen in Newfoundland the trees consumed by lightning on a mountain's sides, a house rent open, large timber cloven, clothes burnt, and iron fused, in a storm of peculiar violence in August, 1852. Such storms as this, however, are rare. Some of the heaviest I have known were in the winter season.

The atmosphere around the whole country seems to be at all times very greatly charged with electricity; but perhaps it is most so in winter. All fur, and the human hair, will discharge the electric fluid very audibly and visibly at every touch; and all woollen clothing, especially that worn next the person, makes a remarkable discharge whenever it is taken off the wearer.

As a consequence of the climate, rather than of any peculiar habits of life, the people, though very few of them are more remote from English parentage than the third generation, are in some particulars a distinct race. They are generally of short stature, attain maturity very early, and are remarkably prolific. They have wonderful power of enduring hardships; but disease, attributable more or less directly to their hard living, is lately becoming very prevalent among them. Consumption of the lungs, almost unknown when I first went there, has increased alarmingly in the past 12 years. Of 37 deaths in my congregation in one year, 14 were from this disease. Caries of the bone is another disease, cases of which are suprisingly numerous. Many of the people suffer from scurvy, especially those persons who for the winter season live and work in the forest above the coast. This, however, is not a new or increasing malady. Diseases of the heart are very common.

A broad belt of forest surrounds the island. The woods are of much finer growth, more various in kind, and much less despoiled by the axe and by fires on the western side and around White Bay, than those to the eastward. Fir, spruce, pine, and birch are in the greatest abundance; but there are also larch, aspen, balsam-poplar, mountain-ash, and alder. Some kinds of timber are becoming extinct in places where a few years ago they grew in plenty, in consequence of unsparing cutting for building purposes and for sale. Pine is thus becoming scarce; so is larch; and it is difficult to get birch of any size larger than for firewood. Many thousands of fir-trees are destroyed annually by rinding. The rind is required to cover fish in the course of curing. I have seen far above the head of one of the bays a solitary spot of fine yellow deal, which seems to be the only remnant, to the eastward at least, of a once common timber-tree, and escapes the axe only because it is far from water, and therefore could not be got out without too great labour. All trees in Newfoundland are of rather stunted growth; but the timber is preferred to the larger and freer grown timber of the American continent, as being harder and more enduring. Attempts have been made to introduce the oak and the ivy, but under the utmost care the plants exist in dwarf size, only to show the impossibility of naturalising them. Several kinds of fruit grow wild, principally upon scrubby bushes and trailing plants on the heaths and swamps. A very good fruit is the one named bake-apple: this is yellow, round, about the size of a cherry, granulated like mulberry. One fruit only is produced by each plant; but they are in such number as to make the whole surface of the marshes yellow in their season. One other berry, equally plentiful upon the heaths, is vulgarly named blackberry, but has no relation to the black or bramble berry of England. These fruits are of great value, not only in the diet of the people, who use them largely, but also for the support of birds and other wild animals, which are killed for food and for their fur.

The severity of the climate, sterility of the soil, and difficulty of procuring and applying manure, are all serious hindrances to agriculture. Fish and kelp are almost the only manures obtainable, and these are very difficult of carriage where no roads exist and there are no horses and carts, which is the case in a great part of the country. Some Scotch settlers upon the Codroy Rivers have grown wheat with some success. Wheat is grown also on the inside lands near St. John's. Only the 13 weeks' grain can be sown, because no fall-sown seed can live through the frosts of winter. Cultivated as it is only upon land far above the sea-shore, the crop has often to be cut green. Barley is grown with more sure success in lands far up the bays; but that, also, in some years cannot be ripened. Turnips are a good and sure crop, and great quantities of potatoes are grown; but these are almost all of poor quality. For this, however, the land is not wholly to blame, for I have proved by repeated experiment, that with proper manure and care it will produce potatoes thoroughly good. Carrots, parsnips, a hardy kind of onion, and cabbage are successfully cultivated, and in the south peas may be grown. These are nearly all the esculent vegetables which the land has been proved capable of producing. Crab-apples, currants, especially the black sort, gooseberries, and damsons, are the only table-fruits; and of these the first and last can be grown only in the south of Newfoundland.

Fur-bearing animals are numerous, and a great source of gain to some of the fishermen, who in winter turn furriers. Arctic foxes are here in all their variety; white, yellow, patch, silver-haired, and black-poles: the last-named the most precious. For good fox-skins, undressed, the furriers get from the merchant who exports them these prices:—white, 1*s.*; yellow, 5*s.*; patch, 40*s.*; silver, 120*s.*; black, 200*s.* Beavers, once nearly extirpated, are now becoming numerous, being unmolested because of the low value of their fur. Brown bears are pretty numerous, and valued both for meat and fur. White bears are sometimes found on the northern promontory of the island, where I imagine they are but visitors, having come to the shore upon the ice which drifts down in spring from the Arctic seas. Wolves were killed for a reward given by the Colonial Government, and became nearly extinct. In 1849 the reward ceased to be paid, and these animals are becoming again numerous and very troublesome. I know one poor man who has lately lost many sheep by them. A man in the Bay of Islands showed me, in 1849, the skins of three large wolves which he caught, out of a gang of six that had chased a deer from the interior country into his garden, and lurked about his house for some days afterwards. One of the six was black, the others were greyish white. Those caught measured six feet from the nose to the end of the tail. Deer are always in very great number in the interior, and sometimes they stray, solitary or in twos and threes, to the outside at any season of the year; but their general habit is to herd together in the northern parts of the interior during summer, and as soon as the snow has set in and buried the moors, flock down southwards through the woods, where only they can then find food. This brings them near the outside of the country and within reach of the people who waylay them on the shores of the lakes, and shoot them in the water. In those winters in which snow does not fall early, no deer come through the forests; but they travel southwards then on the inside. I regard this fact as a corroboration of the general report that the interior country is a great open plain. In such winters, the moors being free from snow, the deer have not occasion to enter the forest, and do not come to the outside. The skin of these animals is invariably spoiled in the slaughtering and wasted. Martens, hares, and ermine are very numerous, and otters and musk-rats are found in almost every pond and brook.

The only discovered relics of bygone times and former inhabitants of the land are of no great age. The remains of Red Indians have sometimes been found buried, not in any general cemetery, but in solitary graves. Five or six years ago such a discovery was made close by the sea-shore in my mission. A large quantity of birch-tree rind had been used in place of a coffin. Within this wrapping only a few small remnants of bone were found; but with them were arrow-heads, a knife, a clay-pipe, a saucer with red ochre, and a brush. These interesting relics were all lost and destroyed through the carelessness of the ignorant man who found them. Reckoning that from the Government or elsewhere he would get some fabulous price for the remains, he kept them in his own custody, but allowed them to be handled by his family and neighbours till they were crumbled and lost. In Bloody Bay and in Fresh-water Bay numerous relics of some former European settlers have been found; but, unfortunately, no value was attached to them by the finders; and they, also, are all lost. They were chiefly coins, knee and shoe buckles, pipes, and earthenware vessels. Of the coins I was told that they bore no other impression than "flowered-work."

HINTS TO TRAVELLERS.

(REVISED AND AUGMENTED EDITION.)

By Vice-Admiral Sir GEORGE BACK, F.R.S., Rear-Admiral COLLINSON, C.B., and FRANCIS GALTON, Esq., F.R.S.

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 recurrence, 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 has been extensively circulated under the title of 'Hints to Travellers;' but as the first edition is nearly exhausted, we have been requested to take the opportunity of making a thorough revision of the work. This we have done. 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, down to the minutest detail, so that an intending traveller may order his outfit at once. He would then be satisfied that he had omitted to provide himself with no object of real importance, that he had bought nothing superfluous, and that the different items corresponded together in size, 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 a beginner 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 describe 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 instrument-makers 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 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 for an Explorer.

Examination of Instruments.—Let every Instrument be tested and its errors determined and tabulated at the Kew Observatory of the British Association. This is done for a trifling fee (ordinary thermometers, 1*s.*; boiling-point thermometers, 2*s.* 6*d.*; ditto by calibration, 5*s.*; marine and portable barometers, 5*s.*; azimuth compasses, 2*s.* 6*d.*; superior sextants, 5*s.*; quadrants, &c., without telescopes, 1*s.* Unifilars, dip circles, and other magnetic instruments are also verified. The instruments should be sent *prepaid*, or taken to the "Superintendent of the Kew Observatory, Richmond." The establishment lies ten minutes' walk from the *Richmond* railway station, and is reached through a farm-yard, leading into a large meadow.

Sextant for regular work—

A sextant of six-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.

The handle must be large and convenient.

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

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

Mercurial Horizon—

The 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.

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.

Compass—

An azimuth compass, graduated from 0° to 360°, with a shield of brass cut out here and there, to admit light, fixed over the glass. *Reserve:* two spare glasses and a second azimuth compass.

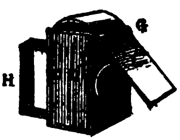
Two pocket compasses, from 1½ to 2 inches in diameter. Their needles must carry cards graduated, like those of the azimuth compass, from 0° to 360°, in addition to the points. These compasses should be light in weight, have plenty of depth, and be furnished with catches, to relieve the needle from its pivot when unused. 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 for night work.

Lantern—

To be used with oil. The reflector should throw a clear light forwards and *downwards*. A good lantern is *most* important. A small ball of spare wick. Oil. Wax candles, for use on detached expeditions.

The following is a good design for a lantern:—

L. The reflector, of stout tin, moving stiffly on a good substantial brass hinge G. It must remain in whatever position it is placed.
D. The door. On opening it, the lamp is slid into its place.
C. The condensing lens.
H. The handle—a substantial one. It folds flat, and is fixed, not to the body of the lantern, but to a shield, to protect the knuckles from the heated body of the lantern. Between the shield and the lantern are the air-holes, to let in air.



Thermometers—

Three short and stout boiling-point thermometers, and a tin pot to boil them in. (*See* p. 286.)

Three ordinary thermometers, graduated to 160° at least, if for hot climates.

Aneroid—

Large pocket size (2½ inches across) capable of working without fracture over the highest mountain pass that is expected.

Mapping Instruments—

Protractors: one large circular brass one, 5 or 6 inches in diameter; 1 horn protractor, 5 inches, all graduated, like your compasses, from 0° to 360°; 2 semicircular ones, 3½.

A graduated ruler of 1 foot or more, in metal; a small square; a *small* case of instruments. 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.

Additional Instruments, not necessary, but convenient.

Telescope—

A large naval or deer-stalking telescope, for observing eclipses of Jupiter's satellites and occultations of small stars. It should be fitted with a micrometer. (*See* p. 281.) The traveller should test it on the satellites, and be himself satisfied that he can see them through it, before concluding the bargain. An ordinary telescope is wholly inadequate for that purpose.

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. 285.)

Pocket level, with a mirror to show where the bubble is, when it is held to the eye.

Mountain apparatus for boiling water, as used by the Alpine Club; useful for determining the heights of windy mountain-tops.

Maxima and minima thermometers. } For meteorological observations, *see*
Rain gauge. } p. 288.

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 cases should be brass-bound; the fittings should be screwed, and not glued; and the instruments should admit of being taken out and replaced with perfect ease. Thermometers travel best when slipped into india-rubber tubes; and a coil of such tubing will serve as a floor, to protect a case of delicate instruments from the effects of a jar.

Stationery—

An artist's board, or at least a stiff portfolio, to rule and draw upon, as large as can conveniently be carried.

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 all be of one size, say 5 inches by 3½, or larger. A leather pouch, having a flap buttoning easily over, to hold the note-book in use.

Two (or three) ledgers 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.

Tracing-paper, both carbonised and transparent.

Blank maps, ruled for latitude and longitude.

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, lake, cobalt, gamboge, oxgall, in a small tin case.

Half-a-dozen sable paint-brushes.

Books—

Raper's, Inman's, or Norie's Navigation Tables.

Weale's Tables are convenient from their compactness.

Shadwell's Cards of formulæ, and Carr's Synopsis, if the traveller has any mathematical knowledge.

Nautical Almanack for current and future years, strongly bound.

Three or four almanacks, such as 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 boiling-point thermometers, to be got at the thermometer-maker's.

Celestial Maps (uncoloured) pasted on canvas (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.

Though 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 work have quite a different character to that of the navigator. 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, and must therefore mainly depend 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 is inconvenient. The use of stars and the mercurial horizon introduces difficulty on the one hand, and great refinement on the other.

3. At sea, the accuracy required for mapping 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, or occultations.

4. Positions at 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 observations are required.

Latitude and Longitude.

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 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 be independent of all 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. Circum-meridian altitudes of stars in pairs, N. and S. of the zenith, 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. When the sky is partly clouded, secure whatever stars you can surely identify, in case the meridian altitudes 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—

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. Taking a few offhand observations, at a great many stations, is time thrown away.

1. No method is more serviceable than that by lunar distances. 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. If thermometric and barometric corrections be omitted, in observations made on a high and heated plateau, there will be serious errors in the results.

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 :—

1. Read thermometer in air.
2. Adjust horizon-glass, if necessary.
3. Two pair 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 they rarely occur. They are very troublesome to calculate.

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 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 day time 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.

Azimuth.

General Remarks.—The azimuth compass is one of a traveller's most useful instruments. To use it, it is best to make a pile of stones and 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.

For true bearing—

The true bearing of a heavenly body may be obtained either from observations of its 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					
	½ hor. ∠ in Arc.		Variation.			

Note.—Arc 2 is of the same affection as the ½ polar dist. and Co. Lat.: when one is acute so is the other, and v. v.
Add arcs 1 and 2, when polar dist. is greater than Co. Latitude.
Subtract „ „ less „ „

The angular distance between the Pole-star, which is only 1½° 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 on the meridian, affords approximate means of attaining at once, without any calculation, the variation of the compass.

Base-Lines.

By Difference of Latitude.—For base-lines the more rapid methods of attainment are alone suitable to the present object. None of these measures is more accurate and speedy than that obtained by meridional 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. (*See* p. 305.)

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.

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.

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

		ANGLE. °		5 0	5 ½	6 0	6 ½	7 0	7 ½	8 0	8 ½	9 0	9 ½	10 0	10 ½	11 0	11 ½	12 3	12 ½	13 0	13 ½	14 0	14 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	88	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	0	88	32	55	62	69	77	85	95	106	118	132	148										
	½	92	56	57	65	78	81	91	102	114	129	145											
15	0	97	10	60	68	77	87	99	110	126	143												
	½	101	36	64	73	88	95	108	123	141													
16	0	106	16	60	79	90	105	121	140														
	½	111	12	76	88	103	120	141															

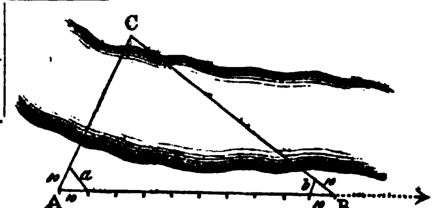


FIG. I.

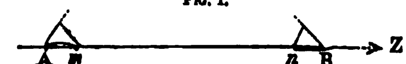


FIG. II.

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.

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 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.)

On a Composition for Keeping Watches or Compasses Watertight. By JAMES BROCK, Chronometer Maker, 21, George Street, Portman Square.

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.

Silvering Sextant Glasses—

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

"Before taking leave of this subject it may not be unimportant to describe the operation of silvering the glasses of sextants, as those employed on surveying duties very frequently have to perform the operation.

"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."

To fill a tube with mercury as a temporary Barometer-tube, for occasional use.

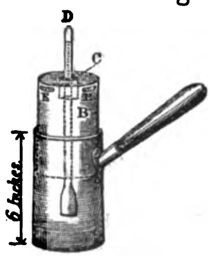
Take the ladle used for melting lead for bullets, and scour it bright with sand. Prop the tube at a slightly inclined angle on the forks of two sticks, planted in the ground, and rake embers of the camp-fire below it. Turn it till thoroughly warm; almost too hot to touch. Strain the mercury through paper 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.

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.

Altitudes, by Thermometer in Boiling Water.

The operation of boiling a thermometer is of the simplest nature in theory, but is often extremely troublesome in practice, without a proper vessel to boil it in. This should have a serviceable wooden handle. The lid should be specially made to hold the thermometer, and to give a vent to the steam. The diagram overleaf shows an effective apparatus. The fire on which it is set should be neatly arranged, and be made of dry wood; it must not be too large or smoky, and it must burn steadily. The saucepan should be set firmly, on stones or sods, or across a narrow trench, that there may be no fear of its upsetting, when the fuel subsides. The observation of the thermometer must be made 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.

The following is the manner in which the observations are taken:—From 4 to 5 inches of water are put into the tin pot; the thermometer is fitted into the aperture in the lid of the sliding tube by means of a collar of cork; the tin tube is then pushed up or down to admit of the bulb of the thermometer being about *two inches* above the bottom of the pot. Free ebullition is continued for three or four minutes, and the height of the mercury is repeatedly ascertained during that time, and the temperature of the air is noticed. 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 others.



A. A common tin pot, 6 inches high by 3 in diameter.

B. A sliding tube of tin, moving up and down in the pot; the head of the tube is closed, but has a tube let into it, of which the upper opening is C. This holds a cork, through which the thermometer is tightly passed.

D. Thermometer, with only so much of the scale left out as may be necessary.

E. Holes for the escape of steam.

When the thermometer has been boiled at the foot and at the summit of a mountain, nothing more is necessary than to deduct the number in the column of feet opposite the boiling point below from the same of the boiling point above: this gives an approximate height, to be multiplied by the number opposite the *mean* temperature of the air in Table II., for the correct altitude:—

	°	Feet.
Boiling point at summit of the hill	204·2 =	4027
„ its foot	208·7 =	1690
Approximate height		2337
Temperature of the air above ..	75°	
„ „ below ..	83	
Mean	79 = Multiplier ..	1·398
Correct altitude		2·566 ft.

When the boiling point at the upper station alone is observed, we may 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 mean temperature of the stratum of air between the upper station and the sea level by Table II.

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	16868	584	..
198	22·64	7324	538	54	180	15·35	17455	587	59
197	22·17	7864	541	..					

TABLE II.—Table of Multipliers to correct the Approximate Height for the Temperature of the Air.

Temperature of the Air.	Multiplier.	Temperature of the Air.	Multiplier.	Temperature of the Air.	Multiplier.	Temperature of the Air.	Multiplier.
°		°				°	
32	1·000	47	1·031	62	1·062	77	1·094
33	1·002	48	1·033	63	1·064	78	1·096
34	1·004	49	1·035	64	1·066	79	1·098
35	1·006	50	1·037	65	1·069	80	1·100
36	1·008	51	1·039	66	1·071	81	1·102
37	1·010	52	1·042	67	1·073	82	1·104
38	1·012	53	1·044	68	1·075	83	1·106
39	1·015	54	1·046	69	1·077	84	1·108
40	1·017	55	1·048	70	1·079	85	1·110
41	1·019	56	1·050	71	1·081	86	1·112
42	1·021	57	1·052	72	1·083	87	1·114
43	1·023	58	1·054	73	1·085	38	1·116
44	1·025	59	1·056	74	1·087	89	1·118
45	1·027	60	1·058	75	1·089	90	1·121
46	1·029	61	1·060	76	1·091	91	1·123

Enter with the mean temperature of the stratum of air traversed, and multiply the approximate height by the number opposite, for the true Altitude.

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.		Elev^{n}	
	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 their spirit, as nearly as they can.

Observations on Heat.

1. *To Expose Thermometers.*—The instrments 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 prin-

ciple 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 $1\frac{1}{2}°$. 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 Herschell.*

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 make-shift.

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.

Extracts from a Letter from John Kirk, m.d., f.l.s., *&c.*

It seems to me that I cannot better carry out the wish of your Committee than by briefly reviewing the various instruments which proved of use during the expedition into East tropical Africa, on which I had the honour to serve under Dr. Livingstone for upwards of five years as chief officer, surgeon, and naturalist. It is not necessary to make reference to work done near the steam-vessel; there every appliance needful for a complete survey might be found. My remarks shall, therefore, be restricted to the land-journeys, where, to secure success, it was necessary to limit the number of our party and reduce to its utmost the baggage, consistent with obtaining scientific information regarding the countries traversed. On such an expedition every pound weight saved is so much more cloth, &c., carried, and represents so many more miles traversed. To this, however, there is a limit, as the instruments must be complete, else the journey were almost time and labour thrown away.

Perhaps no exploring party has travelled in lighter marching order than we did, and yet taken with it the means of scientific research.

Our equipment might be classed as astronomical, meteorological, botanical, and zoological—the heavy loads being barter goods. No tent was carried, and our own personal baggage, besides firearms and ammunition, consisted of a bag of bedding and spare clothing.

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 shoulder 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.

Rate of Travel.—I may state that the usual distance accomplished each travelling day was 10 miles geographical in direct line, without regarding small detours in order to avoid marshes, hills, or nullahs, and the common rate per hour measured in the same way 2¼ miles. Of course this is only true of a long journey; individual days' marches will vary much, reaching 20 miles in a country such as the Batoka plains, and falling to 5 miles after hard continued labour throughout the day, as we found among the hills near the Shiré before they had been mapped in, or by the side of the Zambezi, in the gorge of Kebrabasa, from which all the party, excepting Dr. Livingstone and myself, were forced to turn.

Thermometric Observations.—Maximum and minimum thermometers are of great use; also observations on the temperature of the earth at various depths and of large bodies of running water. Of more importance than delicacy of instruments is the skill shown in the selection of a spot for meteorological observations, free from radiation at night and solar heat by day, whether directly or as coming from local currents off heated sand or blackened rocks.

Collecting Plants and Animals.—I shall only remark that a very valuable series, illustrating both Flora and Fauna, may be packed in very small compass, if judiciously selected and accompanied by notes; but for this a knowledge of each department is needed. Duplicates are to be carefully rejected, and the members of numerous genera sacrificed for others, showing variety of form. Of course, where practicable, a collection cannot be too large or the duplicates too numerous; but the explorer will seldom be encumbered with many specimens.

On the outfit needed to follow Natural History I need not dilate. Each branch would require separate instructions; but for the geographical traveller desirous to do something, all I can say is that his knowledge and common sense must guide him in selecting from the riches around, what he shall bring home. Things of economic uses are always more important than mere curiosities; for, without a scientific knowledge, he will not know the kind of rarity which will be valued at home. He will find common brown paper the best for drying plants, arsenical soap the best preservative for skins, and spirit the only good fluid for wet specimens.

In sending home cases, unless the contents are thoroughly dried, it will not be advisable to close them up in soldered cases, which too often confine the damp and cause mouldiness. A tin-lined box with any flaw in it is worst of all; it will not only admit but retain any water that may fall on it.

Photography is little suited for distant and wild countries, yet where it can be employed is of the greatest service (*See* p. 293). When abandoned, the camera lucida will take its place in delineating natural objects. I shall not now try to induce the traveller to carry with him an apparatus to Central Africa or any such place, but only mention what I found of use on the lower Zambezi. My instrument was an ordinary landscape camera, made by Negretti and Zambra, which, after travelling or lying about for five years in the tropics, came home without a joint loose or slip of wood started. The process adopted was the waxed paper, which, for simplicity of apparatus, and chemicals, and facility in the transport of negatives, has not been surpassed.

One great advantage which I found was the absence of the smell of collodion, which in a hot country seems to be very injurious, and still more of the acetic acid, which I replaced by the citric. The negatives, if washed in the bromide of potassium, need not be fixed for many weeks after, and when finished, if melted together into a cake with bees-wax, may be taken anywhere without danger, and again separated and ironed out at home.

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.

Medicine.—I feel some hesitation in mentioning the requisites for the explorer's medicine-chest (in tropical Africa). If he be one of the profession, he will fit it out according to his own views; but the following may be of use to the non-medical traveller, and I may say, in the first place, that it need not occupy much space, otherwise he may be tempted to use it too often:—

Quinine is the most essential of its contents, and the least apt to harm. In the cure of fever it cannot be overestimated; as a preventive it has utterly failed on the East coast, and thus belied the good name given it by many in other parts. The traveller should be well supplied with quinine of the very best quality; all unbleached kinds are so much impurity; they are no cheaper in reality, and nauseous from the larger dose needed. It may be well to bear in mind that although in mild cases it is as well to precede the quinine by opening medicine, yet that in severe cases it may be given at any stage of the attack and in large doses, from 5 to 20 grains.

Calomel.—If the traveller knows but little of medicine, let him dread this when taken in oft-repeated small doses; it will be in combination with other purgative medicines, such as *resin of jalap* and *rhubarb*, that it is needed; and the best compound he can take in fever will be the following:—quinine, rhubarb, calomel, jalap-resin, three grains of the former and four of the latter, mixed together in powder and made into pills, as needed.

The other remedies next in importance are carbonate of soda, opium, Dover's powder, nitrate of silver, and blistering-fluid. If he is troubled with weak eyes, a 2-grain to the ounce solution of nitrate of silver will perhaps relieve it; but many of the eye-complaints among Europeans in Africa are of a deep-seated nature, indicating a system much reduced and in need of change.

In tropical Africa sunstroke is little dreaded, and the protection to the head necessary in other countries is not requisite; but the clothing should be of flannel or serge. Besides the risk from crocodiles, bathing in the African rivers early is dangerous, for then the water is warm and the air cold.

Before commencing the morning march, a cup of coffee or tea should always be taken, and wet shoes or stockings removed when at rest: nothing is more certain to bring on fever than wet feet.

PHOTOGRAPHY.

"The following note on Portable Photography was written in 1862. The improvements I urged in the dry-plate manufacture have not been carried out, probably for want of sufficient demand; but still, even in the present state of things, one can get on tolerably well.

"I still use my apparatus as before, and, except the addition of an extra lens, to shorten the exposure in difficult cases, I have seen no reason to make any alteration.

"Very sincerely yours,

"W. Pole."

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

[Reprinted, by permission, from 'Macmillan's Magazine.']

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 be easily 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 taking stereoscopic views has now been reduced, by ingenious contrivances, to a very portable size. The one used by the writer is nine inches long, five and a half inches wide, and three inches high—about the dimensions of a good-sized octavo book. It weighs a little over two pounds, and hangs by a strap round the neck in walking with no inconvenience. The stand folds up into a straight stick, which is carried easily in the hand. A stock of eight plates, in slides ready for use (sufficient generally for a day's operations), go into two folding pocket-cases. The tourist can thus walk about without the slightest sense of incumbrance, and is prepared, at any moment, to take a perfect stereoscopic view 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. Of course, however, a stock of plates must be added. A dozen of these, with appropriate packing, will occupy about 8 inches long, 4 inches wide, and 1½ inch high; and from this the space occupied by any number it is proposed to take on the journey may be easily estimated. Suppose there are five dozen—a pretty fair allowance—these, with camera and all complete, will go into a very portable hand-box, or into one of the small black leather bags now so common.

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, 5 inches square and 2½ inches thick, 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 amusement, 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 becoming a very large branch of commerce; but many of the large numbers of 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. (*See* p. 291.)

Hints on the Projection of Routes. By Staff-Commander C. GEORGE, R.N., Curator of Maps R.G.S.

FOR out-door 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 projections 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 *out-door* 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. 305, 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.

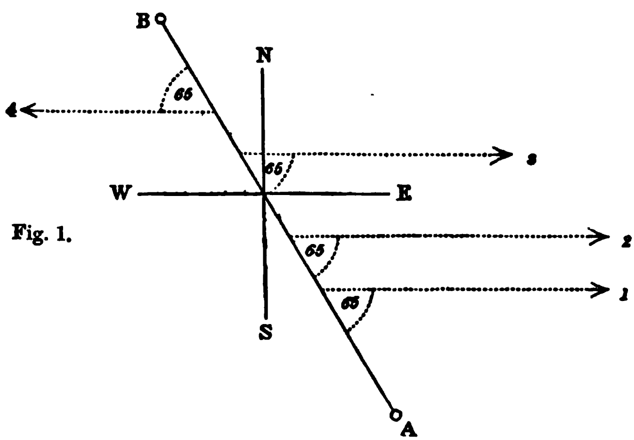
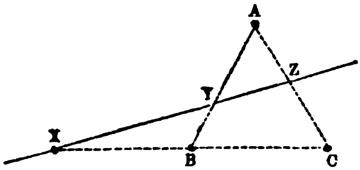


Fig. 1.

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 had 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.)—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 16·7
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 14·3	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.

to construct a map on Mercator's projection, on a scale of 10 miles to an inch equatorial—*i.e.* 6 inches to a 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° to 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.
Φ „ „ 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′ E. 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.

∠'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 highest ▲ 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.
Eor 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. pk.	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, observed 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 58	00 10

∠'s at large Affluent from the Eastward.

	°	′
Same objects	{ 79 94	00 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°.

---

* 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.

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

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

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

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

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

To measure 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 differs from 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 half-a-dozen 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 100 yards) 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 regular 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, ought also to be ascertained.

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.*

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 each of Nos. 5, 14, and 11.

Stone jars for reptiles and fishes in spirit; to fit four 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

---

* Most of the articles of a Naturalist's outfit can be obtained, at a few days' notice, of Mr. S. Stevens, Natural History Agent, 24, Bloomsbury-street, W.C.

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 very 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 authorised 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, antilope, 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

* 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.

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, 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 deteriorated 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 their lives, 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 that if a microscope is ever needed in his journey, that by unscrewing the small tubes of the telescope a compound microscope of considerable power is produced.

INDEX

TO

VOLUME THE THIRTY-FOURTH.

Aal-Amār tribe, 121.
'Aalam Es Sa'ad, 120.
Aal-Morrah tribe, 122.
'Aared, province of, 131.
Africa, Inner, Antiquity of Physical Geography of, by Sir R. I. Murchison, 201.
Agnes, Mount, 187.
Agricultural country in Otago and Southland, 68.
Aguara, Monte, 227, 228, 229.
Aguirre, Don Francisco de, 240.
Ahraraigi Mountain, 90.
'Ajman tribe, 121.
Akhāf, 122.
Alabaster, Lake, 108.
Alberni Canal, 165, 167.
Alba, Mount, 91.
Alps, Southern, 87.
Alumpi La, 52, 55.
——— Loombah, 55.
———, ridge of, 27.
Amba, 236.
Amope, 231.
Anconquija, 238.
Andes of Chili, Expedition across, by Don G. Cox.
Angazecha, 258.
Anita Bay, 101.
——— Poso, 230, 231.
Ansted, Mount, New Zealand, height of, 74.
Antler Creek, 190.
Ape's Hill, Formosa, Mineralogy of, 11, 15.
Arabia, Mr. Palgrave's observations in, 111.
Arabian desert, 112.
Arabia, height of hills in, 114.
Arab traders on Lake Nyassa, 246.
Arahaura River, 88.
Ardeer Peak, 60.
Argyle Burn, New Zealand, 64.
Arias, Rio de, 235.
Arrowsmith, Mount, New Zealand, 94.
———————, Vancouver Island, 154.
Arrowsmith, Mr., Map of Rio Negro, 206.
Arrow River, 62.
Arrowtown, 64.
Arroyo de Athanaja, 241.
——— Capitan, 227.
Arthur River, 100.
Arundu, road to, 46.
Arusha hills, 3.
Asses, in Arabia, 140.
Ashburton Glacier, 94.
Ashwanipi or Hamilton River, 82.
Askolè, village of, 28.
Aspiring, Mount, 88.
Astore, 26-55.
Atoser Glacier, 20.
Atamisca, 240.
Aurum, Mount, height of, 74.
Awarua River, 104.

Babisa tribes, 247.
Bagual, 238.
Bahreyn Island, 141.
Bahr-el-Benat, 145.
Bahholah, 148.
Bain, Mr. A. G., 203.
Baltistan Valleys, 19.
——— Villages, 31.
Bald Mountain, 187.
Barren Mountains in Otago and Southland, mineral composition of, 69.
Banca, town of, Formosa, 8.
Baramu, altitude of, 2.
Baradero, 227.
Barclay Sound, 167.
Bariloche, Pass of, 206, 214, 226.
Barley in Formosa, 16.
Bassidore, 253.
Bandè Loombah, 23.
Bay of Islands, Newfoundland, 264.
Beaver Valley, 184.
Beeches in Otago and Southland, different kinds of, 69.
Bedouin tribes, 115.
Bedouin population in 'Oman, 152.
Belgrano, General, 235.

Bemba Lake, 247, 248.
Benel, 234.
Benoo Atiyeh tribe, 121.
——— Hajar clan, 121.
——— Khalid clan, 121.
Benoo-Lam clan, 121.
Bereydah, 126.
Biafo Glacier, 29, 36, 50.
Biaho River, 29.
Bianchu, 19.
Big Ben Mount, 88.
Birch in Otago and Southland, different kinds of, 69.
Birch, Red, useful timber tree in New Zealand, 69.
Bisher tribe, 121.
Black Umbrella Mountain, New Zealand, 81.
Blackfeet Indians, 86
Bloody Spaniard plant, 95.
Boca de Matara, 233.
Bold Peak, height of, 74.
Bonpland, Mount, height of, 74.
Boorje La, 22.
Boquete de Rosalez, 207.
Borland River, New Zealand, 60.
Boulders in Labrador, 83.
Braldoh, 27.
Brazo Brano, 227.
———Largo, 227,
——— de la Mini, 227.
Breaksea Sound, 98.
Brewster, Mount, 90.
British Columbia, Lieut. Palmer's Remarks on, 171.
Bryneira Mountains, 108.
Bükpon Tso, 48.
Bull's Arm Bay, 265.
Bunder Abbass, 256, 258.
Burdomŭl, 36.
Bushire Peninsula, 256.
Byicha, 53.
Bzo, 31.

Cabrera, Don G. L. de, 242.
Calbuco, Mount, 207.
Calenfú River, 222.
Callitué River, 224.
Camels in Central Arabia, 133.
Campbell, Mr., C. E., survey for Railway in Argentine Provinces, 243.
Camphor in Formosa, 16.
Camphor-oil, 17.
Cañada de la Soledad, 228.
Candelaria, 231.
Canterbury Province, New Zealand, Dr. Haast's Notes on Mountains of, 87.
Caples, Mr., Explorations in Otago, 110.
——— River, 63.
Capilla de la Encruzijada, 231.
Caravacal, 232, 233.
Cariboo Mines, 186.
——— moss in Labrador, 85.
Carmen, 223.
Cascade Range, 173.
Castro, Don M. A. de, 242.
Castellanos Rio de, 235.
Catamarca, 237, 238.
Catapuliche River, 206.
Cedar District, 164.
Cemetery Point, 101.
Centaur Peaks, New Zealand, height of, 74.
Cerillo, 233.
Chaco Indians, 234, 236.
——— plains, 229.
Chalky Island, 98.
Chañar, 231, 238.
——— Muyu, 235.
Chase River, 164.
Chemainus, 163.
Chilca, 234, 239.
Chilcotin River, 175.
Chimchuin River, 223.
Chinese miners, 12.
Chiring, 34.
Chogochu-mik, 22.
Chokpojong, 43.
Choleechel Island, 206.
Chongnoltèr, 31.
Chongo, 42.
Chongulter, 34.
Christians in Eastern Africa, 1.
Christina Mount, New Zealand, height of, 74.
Chungoksigo Peak, 20.
Chutrun, 22, 46.
Clarence Straits, Persian Gulf, 254.
Classen Glacier, 93.
Clayoquot Sound, 166.
Cleddau River, 100.
Clinton River, New Zealand, 61.
Clode Sound Water, 264.
Clutha River, 57.
Clyde Glacier, 95.
Coal, Formosan, 12.
——— in Central Arabia, 136.
——— in Shiré Valley, 198.
——— in Zambesi Valley, 203.
Coal-fields of Vancouver Island, 164.
Cobos, 235.
Codroy River, 364.
Coghlan, Mr. J., 228, 229.
Collin's Bay, New Zealand, 66.
Coldwater River, 83.
Comiaken, 163.
Comoro Islands, 258, *et seq.*
——— Mountain, height of, 259.
Comux, Valley of, 166.
Concepcion River, Salado, 230.
——— Bay, 265.
Concha, Rio de la, 235.

Cook, Mount, 90.
Cordonara, 236.
Cordova city, 242.
———, sierras of, 230.
Coronda, 228.
Coropampa, 234.
Corral Grande, 236.
Cosholnioq, 234.
Cosmos Peak, height of, 74.
Cowitchin Valley, 163.
Cranberry District, 164.
Crees Indians, 86.
Crown Ridge, New Zealand, 67.
Cululu River, 228, 229.
Cut-off Valley, 184.

Daffeta River. 3.
Dahirah Province, 150.
Dahna Desert, 117.
Darran Mountains, 108.
Dart River Valley, New Zealand, 57.
———, New Zealand, 62.
Date-trees in Arabia, 132.
Dean Forest, New Zealand, extent of, 73.
——— River, New Zealand, 60.
Deas Cove, 99.
Delcalzis, 206.
Deosai, plains of, 22.
Desolation, Pass of, 208.
Diamante, 227.
Diana Peak, height of, 74.
Dicynodon, 202.
Ding Brausa, 48.
Djagga country, 3.
Djebel-Aared, 128.
——— Akhdar, 146.
——— 'Atälah, 128.
——— Salma, 124.
——— Shomer, 112.
——— Solma, 118.
——— Toweyk, 130.
Djelajil, 131.
Djowf, 112, 123.
Doko, 47, 50.
Doll, Mr., 207.
Dome Burn, 64.
Donderobo fly, 5.
Doon River, New Zealand, 61.
Dora Loombah, 54.
Doré La, Pass, 56.
Douäny, 260.
Doubtful Inlet, 99.
Douglas Coal Mine, Vancouver Island, 165.
Dowasir tribe, 121.
Drenmüng, 33.
Dulce Rio, 240, 241.
Dumordo, 36.
Dunton Forest, New Zealand, extent of, 73.
Dumültèr Glacier, 31.
Dusky Bay, 98.

Earnslaw Glacier, 56.
———, Mount, height of, 74.
Edward Peak, New Zealand, height of, 74.
Eglinton River, New Zealand, 61.
El Carmen, 233.
El Guanaco, 231.
Elie de Beaumont, Mount, 89.
Encarnacion, Rio de la, 206, 219.
Entre Rios, 227.
Er-Riad, 125.
Escoije, 235.
Esperanza, 228, 229.
———, Mount, 207, 212.
Esquimalt District, 161.
——— Village, 161.
Esteco, 238.
Everest, Mount, 23.
'Eyanah, 129.
'Eyn-Nejem, sulphurous spring, 138.
'Eyoon, 126.

Favorina, 236.
Fonk, Dr., 207, 211.
Forbes, Mount, 94.
——— and Humboldt Mountains, New Zealand, 56, 62.
Forests in Otago and Southland, 68, 78.
Formosa, Mr. Swinhoe on, 6 *et seq.*
Forok Tso, 54.
Fort Rupert, 166.
——— Alexander, 177.
Fossil shells in Inner Africa, 202.
Fox Point, 100.
Franklin, Mount, 88.
Fraser Estuary, 174.
——— River, description of, 176.
Freshwater Bay, 264.
——— Basin, 101.
Freels Cape, 264.
Frio, River, 211, 212.
Fuca, Straits of, 167.
Fuerte de Bracho, 232, 233, 234.
Fuertecita, 231.
Funes, Dean, 237, 240.

Gambo Ponds, 264.
Gander Bay Pond, 264.
Garden Islands, 98.
Garza, 234.
Gauchipas, 235.
Glacier lakes in the Mustakh Range, 49.
Glacier-producing zone, Middle Island, New Zealand, 56.

Glaciers of Mustakh Range, thickness of, 50.
Glaisnock, River, New Zealand, 61.
Godley River, 89.
——— Glacier, 93.
Gol, 21.
Golab Singh, tents of, swept away by an inundation of the Indus, 24.
Gomez, Don Vicente, 207, 208.
Gommathaumigo, 21.
Goobalpur, 46.
Gow Burn, 64.
Gramilla, 232, 233, 236.
Gratz, Baron du, 228.
Grass-cloth fibre in Formosa, 16.
Gray Range, 90.
Greenstone River, New Zealand, 62, 109.
Greenspond Harbour, 266.
Greenland currents past Newfoundland, 267.
Grumillaco, 233.
Guanacos, Rio de, 235.
Guaychani, 240.
Guaype, 236.
Gun, Mr., 107, 109.
Gunto La, 22.
Gusherbrum Peak, 39.

Haast, River, 90.
Haast's Pass, New Zeala d Alps, 90.
Haidinger, Mount, 96.
Hawea River, 57.
Haramosh Peak, 47.
Harb tribe, 121.
Harper's Pass, 88.
Hasa, Province of, 138.
——— Range, 119.
Hatim-et-Tai, 124.
Hā'yel, 112, 123.
Herreira, 236.
Hia-hoo, River, 15.
Himalayan Chain, 21.
Himyarite population in 'Oman, 152.
Hisper, in Nagayr, 49.
Hochstetter Glacier, 93.
Hofhouf, 139.
Hoh Loombah, 42.
Holder, Lieut., 7.
Holmes, Mount, 90.
Hollyford River, 107.
Hooker Range, 90.
——— Glacier, 90, 94.
Horeymelah, 131.
Hormuz, 257.
Horses in Central Arabia, 133.
Horsey, Capt. A. de, on Comoro Islands, 258 *et seq.*
Hoseyn, Basha, 119.
Howeytat tribe, 121.
Howloko Lake, 72.
Huanacos Lake, 212.
Hudson Bay Company in British Columbia, 172.
Humboldt Ridge, height of, 74.
Humiliato, 236.
Hunter Mountains, 60.
Hŭrimŭl Village, 52.
Hurunui, River, sources of, 88.
Hushè Valley, 19.
——— River, 21.
Hutchinson, Mr., 108.
Huxley, Professor, 201.
Hyde, Mount, 64.

Inchiguasi, 242.
Indians of Chili, 206.
Indian Bay, 265.
Indus, currents of, 19.
Ithel-trees, 124.
Itzanda, 259.

James Peak, height of, 74.
Jipé River, 3.
——— Lake, 2, 3.
Johanna Peak, height of, 261.
——— Island, 261.
Johnstone Straits, 166.
Jujuy, 237.
Juramento River, 235.
Jusserpo La, 51.
Jute in Formosa, 16.

Kaduka River, 107.
Kahtan tribe, 121.
Kaimatau Mountains, 88.
Kaiyu, Village of, 46.
Kakapo Lake, 106.
Kalhat, 146.
Kala'at Bisha, 126.
Kapaloo, 21, 37.
Kapashna, 24.
Karakorām Range, 19.
——— Watershed, 39.
Kärsten, Dr., companion of Baron von der Decken, 1.
Kaseem, 118, 126.
Katar, 144.
Kateef, Palace of, 139.
Kawarau Valley, 58, 61, 71.
Kefa, 124.
Kelaat Bisha, 118.
Kelung, 8, 15.
——— Mines, Formosa, 12
Kèro Loombah, 47.
——— Ganse, 48.
Khobanies, 25.
Khumeer, Straits of, 255.
Kilima-ndjaro, Baron von der Decken's journey, 1.

Kimandara, Sultan, 4.
Kipchun, 24.
Kiris, 19.
Kirk, Dr., 201.
Kishm, Island of, 251, *et seq.*
Koleyb Wail, 126.
Komăra, 24.
Kong, Portuguese fort, 252.
Korophon, 41.
Koser Gunge, Mountain of, 46.
Koshūmūl, Village of, 46.
Kota-Kota Bay, 246.
Koueyt, 118.
Kownee, 253.
Kuardo, 21.
Kurosiwo, or Pacific current on shores of Formosa, 10.
Kūrpito, 22.
Kūtchè Brausa, 48.
Kutchi Bore La, 54.
Kutzah, 27.
Kutzurah, 54.
Kyuquot, 166.

La Brandon, 236.
Labrador series of rocks, 86.
——— tea-plant, 86.
Lachiguana, 234.
Lacar Lake, 224.
La Canada, 231.
La Cruz River, 229.
Ladak, 44.
Laguna Guadeloupe, 228.
——— Larga, 243.
——— de los Torres, 231.
Lake District, Vancouver Island, 162.
Lakes of Canterbury province, formation of, 92.
——— New Zealand, depths of, 58.
———, Winds of, 59.
Llanquihué Lake, 208.
Llawrenny Peaks, 100.
Lali-cura, 222.
Lanzopheuma, 20.
Larkins Mount, height of, 74.
Las Palmas, 227.
—— Palmitas, 231.
—— Tres Cruces, 236, 238.
Laurentian rocks in Labrador, 85.
Laurus Camphora, 17.
Lavayer, Rio de, 235.
Leather Pass, 177.
Leagues, different kinds of, in Argentine Republic, 230.
Lee Bay, 98.
Lenglier M., 208, 211.
Lerma, Valley of, 235.
Lifen Pass, 225.
Lightning Creek, 190.
Lillburn River, New Zealand, 60.
Limay River, 206, 215, *et seq.*
Lingah, description of, 251.
Livingstone, Dr., on Lake Nyassa and neighbourhood, 245.
Lloa, 234.
Loangwa River, 247.
Loapula River, 248.
Lobaton, 243.
Lochy River, New Zealand, 62.
Lo-han Mountains, 8.
Loretto, 240.
Los Sanchos, 236.
Los Tres Posos, 236.
Lowhee Creek, 190.
Luapula River, 248.
Luft, 254.
Lupata, Pass of, 198.

Ma'ān, 126.
Ma'az tribe, 121.
Macaulay Glaciers, 94.
Macha Muerta, 231.
Mackenzie, Bishop, 250.
Mackrell Ponds, 264.
Maclear, Cape, 246.
Magpie River, 84.
Makarora River, 90.
Mammal fossil bones in delta of Zambesi, 200.
Manganja tribes, 247.
Manipori Lake, 57, 74.
Manuel Garcia, 231.
Mararoa River, New Zealand, 60.
Maravi tribes, 246.
Mariquita Lake, 231.
Markh tree, 130.
Maroni, 259.
Martin's Bay, 106.
Masherbrum, 20.
Mashkulla, 25.
Maskat, 148.
Matan, Rio de, 235.
Matara, 233, 236.
Mataura River, 58.
Matukituki River, Valley, 57.
Matuntoro Klas, 52.
Maullin River, 208.
Maury, Capt., 10.
Mavégani Mountain, 263.
Mavora Lakes, New Zealand, 60.
——— Mount, height of, 74.
Maylin, 232, 233, 234.
Mayotta Island, 262.
Mazite, 246.
Mazzar, 44.
Mecca, 116.
Meincke, Capt., 10.
Mekran Coast, 253.
Melendez, Father, 206.
Menamah, 141.
Menaseer tribe, 122.
Mendi-Khur, 53.

Mendi Rope-bridge over the Indus, 53.
Mendoza, 237.
Meru Mount, altitude of, 3.
Mesaleekh clan, 121.
Meshid Alee, 123.
Metchosin District, 161.
Meteyr tribe, 121.
Michaux André, 84.
Milford Sound, 99.
Minao, 257.
Minerals collected near Kilima-ndjaro, 2, 5.
Mingan Mountains, 84.
Miraflores, 235.
Mission of the Universities on the Zambesi, 250.
Mistassini Lake, 85,
M'Kellar, Mr., 63, 107, 109.
M'Lean, Mr., 84.
Moero Lake, 248.
Moffat Peak, height of, 74.
Mofu Lake, 248.
Mohanna, 119.
Moharrek, 141, 143.
Mohilla Island, 260.
Moisie River, Mr. Hind's exploration of, 82.
Moitala River, 247.
Mojorras, 239.
Moke Creek, 63.
—— Lake, 67.
Monowai Lake, Extent of, 74.
———— River, New Zealand, 60.
Montagnais Indians, 82, 86.
Montefik clan, 121.
Montt, Port, 207,
Moonlight Creek, 63.
Moorhouse Range, 90.
Moraledad, 214.
Morsillo, 234.
Mouchamouli, 259.
Mountain District, 164.
Moussa Moudou, 261.
Mueller Glacier, 90, 94.
Munchin, 233.
Munder Loombah, 54.
Mungo Gûsor, 28.
Murchison Glacier, 93.
Musjid, 45.
Mustakh Glacier, 36.
———— Pass, 30.
————, Recent changes in the passes of, 51.

Nagayr, 22.
———, People of, 29.
Nahuel-huapi Lake, 206, 211, 212
Nanaimo, Delta of, 164.
————, District, 164.
Nancy Sound, 98.
Nanga Purbet, 27, 55.
Nang Brok, 27.
Naphtha-springs on Island Kishm, 54.
Nasquapee Indians, 82, 86.
Navicha, 233.
Nefood, 116.
Negro, antiquity of his race, 205.
——— Population in 'Oman, 151.
——— River, 206.
Nejed, 123.
———, Climate of, 136.
———, Heights of, 130.
———, Inhabitants of, 135.
Nejdean Towns, 131.
Newfoundland, Physical Geography of, 263, *et seq.*
New Westminster, British Columbia, 178.
Nezel, in Arabic, meaning of, 129.
Nezwah, 148.
Niaro, Glacier of, 47.
Nicholas Mount, 81.
Nine-pin Rocks, 166.
Nipisis Lake, 85.
Nobûndi Sobûndi, Peaks of, 44.
Nolloth, Capt., 261.
Nootka Sound, 166.
Nubra, Currents of, 19.
Numa-Choa, 260.
Nuñez de Prado, Don Juan, 240.
Nushik La, 42, 48.
Nyassa Lake, Dr. Livingstone's journey to, 245.
——————, elevated beaches of, 201.

Ocean Pond, 264.
Ojibways, Indians, 86.
Okanagan Lake, 184.
Okitika River, 88.
'Oman, 145.
———, Climate of, 152.
———, Provinces of, 153.
Omanites, Customs of the, 149.
Oneyzah, 126.
Orawea River, New Zealand, 60.
Oreti River, 64.
Osorno, Volcano, 207, 212.
Otago Heads, currents near, 97.
——, Hector's expedition to West coast of, 96.
——, New Zealand, Mountains of, 56.
—— and Southland, means of communication in, 70.
'Oteybah tribe, 121.
Oweysit, 126.

Pacific Gulf-stream, Formosa, 10.
Paddock Hill, New Zealand, 65.

Page, Captain, 226, *et seq.*, 238, 240, 242, 244.
Paillacan, Cacique, 220.
Pakora Klas, 52.
Palmaris, 236.
Paraná cito, 227.
——— River, 227.
——— Guazú, 227.
Paraguay, 237.
Paré Range, East Africa, 2.
Parhon, 227.
Parish, Sir Woodbine, 206, 228, 238, 239, 242.
Pasaje River, 235.
Paso de la Banda, 240.
——— St. Thomas, 228.
——— Vinal, 228.
Pasture, in Otago and Southland, 64, *et seq.*
Paz, Don I. M., 243.
Peace River, 103.
Pearl-fishery in Persian Gulf, 142.
Pelly, Col. Lewis, on Island of Kishm, 251.
Pembroke Peak, 100, 103.
Peninsula Hill, New Zealand, 67.
Perihuico Lake, 224.
Perry, Capt., on Pacific currents, 10.
Persian pilgrims in Arabia, 119.
Petermann Mount, 89.
Petroleum in Formosa, 17.
Petrohué River, 299.
Petshikupan, 84.
Piedras, Rio de las, 235.
Pilchard's Island, 265.
Pinto, Rio, 241.
Piscoquisi River, 242.
Poets in Province of 'Oman, 151.
Polvidero, 233.
Pomony, 261.
Ponciana Pucheta, 231.
Porongos Lake, 230, 231.
Port Venado, 214.
—— William, 98.
Pottery, fragments found with fossil bones in Zambesi Delta, 200.
Preservation Inlet, 98.
Puella River, 209, 210, 212.
Puesto de Castra, 231.
——— de la Viuda, 231.
——— de Luna, 231.
——— del Medio, 231.
——— del Monte Abajo, 233.
——— del Monte Arriba, 233.
Pukaki Lake, 89.
—————, Height of, 96.
Punmah Glacier, 30, 33.
Puntiagudo, Mount, 209.
Punto de Diamante, Rio, 235.
Puskora, Village of, 42.
Quamichen, 163.
Quatsino, 166.
Quebracho, 229.
Queenstown, New Zealand, 67.
Quem-quem-tru River, 223.
Queni, Lake of, 225.
Quesnelle River, 175.
Quibua, 231.
Quiroja, Don F., 243.

Rakaia River, Pass over New Zealand Alps, 88.
Ramada, 239.
Rams y Rubert, Don Estevan, 228.
Ranco, Pass of, 225.
Rangitata, Sources of, 89.
Rangoon earth-oil, 18.
Ras Mesandom, 146.
Rass, 126.
Rattans in Formosa, 16.
R'Bunnoch, La, 55.
Reduccion, 236.
Rees River, New Zealand, 62.
Reloncavi, Bay of, 206.
Remate, 238.
Repecho, 236.
Riad, Capital of Nejed, 136.
Rice in Formosa, 16.
—— Paper in Formosa, 16.
Richards, Capt. G. H., R.N., 156, 162.
Richardson Mountains, 62.
Rinihué Lake, 224.
Rioja, 237.
Rio Primeiro, 230.
Rither Range, 90.
Riverton Harbour, 97.
Rio Blanco, 235.
—— Dulce, 231, 232.
—— Seco, 241.
—— Segundo, 230.
Rock Creek, 193.
Rondu, 22.
Roo'alah tribe, 121.
Roo's-el-Djebal, 146.
Rosalez Pass, 210.
Rosario, important position of, 243.
———, Rio de, 235.
Roscher, Dr., 1.
Rovuma River, Bar of, 251.
——— ——— tertiary formations on the, 198.
Rumipuku, 231.
R'Zong, La, 42.

Saanich Districts, 162.
Sabalia, Don J. A., 235.
Sakr tribe, 121.
Saladillo, 232, 233, 240.
——— River, 229.

Salado Valley, 226, *et seq.*
Salavina, 232, 233, 240.
Sallas Island, 163.
Salinas del Aloma Blanco, 231.
Sali, Rio de, 238.
Salta, 235, 237.
Saltoro River, 21.
San Francisco, Pass over Andes, 245.
—— Isidro, 236.
—— José, 236.
—— Juan, Island, 168.
—— Miguel, 234, 238.
—— Roque, 230, 231.
Santa Fé, 228.
——— Lucia, 232, 233.
——— Rosa, 233.
Santiago, 240.
———— del Estero, 230.
————, Province, 232, 234.
Sariyah, 126.
Sauce, 229.
Scherarat tribe, 121.
Schlangintweit, M. A., 29.
Scott, Cape, Vancouver Island, 166.
Sebaa' tribe, 121.
Sedeyr, 131.
Sefton Mount, 96.
Serrania de Limbreras, 235.
Shakrah, 128, 131.
Shanasir Pir, rock of, 43.
Sharja, 146.
Shawnigan, 163.
Sheep-farming in Southland, New Zealand, 65.
Shigar, 19, 22.
——— Luggo, 23.
——— Valley, changes in the climate of, 51.
Shigari, 24.
Shigarthang, 55.
Shingchŭkpi, 32, 36.
Shiré River, 196.
Shomer clan, 121.
——— Mountains, 123.
Shoshuenco River, 224.
Shotover River, 62.
Sidr tree, 130.
Sierra del Chilco, 241.
Silleta, Rio de la, 235.
Simbolo, 236.
Simolar Mountains, 242.
Skardo, 19, 21.
Skeenmŭng, 32, 33.
Skipper's Creek, 63.
———— Range, 108.
Snowshoe Mount, 187.
Sohar, 148.
Soledad, Sierra de la, 241.
Solis, Don Juan de, 226.
Somess River, 167.
Sominos, 163.
Sonchoposa, 234.
Sooke River, 161.
——— District, 160.
Sookean River, Formosa, 15.
Soor, Village, 145.
Sotalije, 240.
Southland, New Zealand, Mountains of, 56.
Southport, New Zealand, 98.
Spanboo, Village of, 45.
Speke, Captain, 203.
Spencer Mountains, 88.
Spey River, New Zealand, 61.
Srinagar, 19.
Standokmo, Village of, 27.
Steeple Burn, 64.
Steven Burn, 64.
Stewart's Island, 97.
St. George's Bay, 264.
Stiakboo Brausa, 48.
Stokes Mount, 90.
Stokchŭn, Village, 54.
Stok La, 52.
Stone Peak, height of, 74.
Stony Creek, 63.
Stuart, Mount, 91.
Sturgeon in Fraser River, 180.
Sugar in Formosa, 16.
Sullivan, Commander, 226.
Sulphur Mines, Formosa, 13.
Sumampa, 232, 233.
Sunchales Road, 230, 231.
Surŭngo, 42.

Taboada, General Don A., 228, 232, 234, 236, 238, 240.
Taiwanfoo, City of, 7, 15.
Taiwan, or Formosa, 6.
Tajamares, 231.
Takafro Lake, 89.
Takitimo Mountains, 65.
Talaposa, 234.
Talh tree, 130.
Tamsuy, Formosa, 8, 9, 15.
Tandoro, Village of, 44.
Tanganyika Lake, 248.
Taramakau River, 88.
Tarucapampa, 233.
Tasman Glacier, 92.
——— River, 89, 93.
Ta-tun Mountains, 8.
Te Anau Lake, New Zealand, flood-marks, 57.
——————————, Extent of, 74.
Tea grown in Formosa, 15.
Techado Peak, 210.
Teek-tsan, Formosa, 15.
Teiyyahah tribe, 121.
Telal Ebn-Rashid, 123.

Temperature, signs of recent changes of, in the Himalaya, 51.
Temple Peak, height of, 74.
Teté, 196.
——, Sandstone formation, 197.
Teymah, 118.
Thibet, 19.
Thùllè Valley, 19.
Thompson, Dr., 19.
Thompson River, 175, 177.
———— Sound, 99.
Thornton, Mr. R., companion of Baron von der Decken, 1; last days of, 198.
————, geological map of, 201.
Thoweynee Ebn-Sa'eed, 145.
Thyarlung, 22.
Tigre River, 227.
Titiroa Forest, New Zealand, extent of, 73.
Tobacco-smoking abhorred in Wadi-Dowasir, 134.
Todos Santos Lake, 207, 209.
Tolahihu, 238.
Tongnol, 42.
Top-of-the-Ridge Range, Labrador, 84.
Torlesse, Mount, 88.
Tormik River, 52.
Tortegas, Rio de los, 241.
Totara Cedar, 69, 102.
Toweyk, 128.
Tozer, Bishop, 250.
Trans-Indus, Peaks of, 34.
Trinity Harbour, 265.
Tripe de Roche, 86.
Tronador, Mount, 209, 210, 212.
Trumbal, Cerro, 224.
Tsenga Hills, 246.
Tsogo, Village of, 46.
Tsok, 30, 36, 54.
Tsokar, camping-ground of, 34.
Tucuman, 236, 237, 238.
Tungshao, 17.
Turkee, 119.
Turnbull Mount, height of, 74.
Twillingate Harbour, 265.
Tyndall Mount, 74, 89.

Uchongui Peak, 263.
Ugono Range, altitude of, 3.
——— tribe, 3.
Umiampa, 236.
Upukerora River, 61.
Uruguay, 227.
Uru territory, 4.
Usambara, 2.

Valdivia, 206.
————, River of, 224.
Valley of Orthodoxy, 129.
Vancouver Island, coalfields of, 164.
————, Dr. Forbes' notes on, 154.
————, Climate of, 158.
Victoria District, Vancouver Island, 161.
——— Town, ————, 162.
——— Harbour, ————, 162.
Vigne, Mr., 19.
Villarino, Don B., 205.
Vivoras, Rio de las, 229.
Von River, New Zealand, 62.

Wadi Dowasir, 134.
—— Farook, 115.
—— Haneefah, 128, 129.
—— Moseylemah, 129.
—— Nejran, 118.
—— Sirhan, 116.
Wahhabee dominions, 134.
Waiau river system, 57, 59.
Waimakiriri River, 88.
Wairaki River, New Zealand, 60.
Waitaki River, 89.
Wakaia Valley, 67.
Wakatipu-Kaduku, 106.
———— Districts, resources of, 71.
———— Lake, 58.
————, extent of, 74.
Waller, Mr., 250.
Wallin, Mr., 112, 115, *et seq.*
Wa-Massai, hostility to Baron von der Decken, 4.
Wanaka Lake, 58, 90.
——— River, 57.
Wanga, 2.
Ward Mount, 90.
Washington territory, 157.
Wa-Ugono tribe, 5.
Wawaihiwuk Lake, 108.
Wells in Central Arabia, 132.
Wellsted, Capt., 146.
West River, 175.
Wheat in Formosa, 16.
Wheelwright, Mr., proposed Railway in Argentine Republic, 243.
Whitcombe, Mr., 88.
White Bay, 264.
Whitestone Creek, New Zealand, 60.
Williams Creek, 190.
Woody Point, 166.
Woold-Alee tribe, 121.
Woo-tse River, Formosa, 15.
Worsley River, New Zealand, 61.
Woshem, 118, 131.

Yak, 31.
Yale, British Columbia, 194.

Yarkund, Passes into, changes of, 51.
Yatasta, Rio de, 235.
Yemamah District, 131.
Yemen, 118.

Zambesi Delta, fossil bones in, by Dr. Kirk, 199.
Zambesi, tertiary formations on the, 196.
Zarate, 229.
Zaudzi Island, 263.
Zoah, 20.
Zobeyr, 118.
Zulphah, 127.

END OF VOL. XXXIV.

LONDON: PRINTED BY W. CLOWES AND SONS, STAMFORD STREET AND CHARING CROSS.